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A

TREATISE

OF

DECIMAL ARITHMETIC;

OR,

DECIMALS applied to the COMMON RULES
of ARITHMETIC; the COMPUTATION
and ARBITRATION of EXCHANGES; INTEREST,
SIMPLE and COMPOUND; ANNUITIES for Years
certain; alſo on *Lives*. With the Doctrine of
Circulating or *Repeating Decimals*.

The WHOLE

Interſperſed with ſeveral ſhort and new Methods of anſwering Queſtions relating to Trade and Buſineſs; and
ſhewing throughout that moſt Computations therein are
much eaſier performed by Decimals than by Whole
Numbers.

ADAPTED

To the Uſe of SCHOOLS and the MAN OF BUSINESS.

By R. GADESBY,

WRITING-MASTER and ACCOUNTANT.

LONDON:
Printed for A. MILLAR in the *Strand*.
M.DCC.LVII.

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THE
PREFACE.

T*HE Utility of* Decimals *in all Sorts of* Computations *is well known to thoſe who are acquainted with* Mathematical Literature; *my Deſign in this Treatiſe is to ſhew the particular Advantages of employing them in* ſuch Computations *as occur in the Courſe of* Trade *and* Buſineſs. *I do not here include* Menſuration *and* Gauging, *as theſe uſeful Arts have been fully treated of in many Mathematical Books, and ſome Authors have written wholly on them. Indeed the Uſefulneſs of* Decimals *in* Computations *relative to* Trade, *&c. has been already treated of by an eminent Hand in his* Univerſal Syſtem of Decimal Arithmetic; *but finding upon the Peruſal of it, that there was ſtill Room for ſeveral Improvements in ſuch* Computations, *and that it was upon the whole better adapted to the* Scholar *than to the* Man of Buſineſs, *for whom this is chiefly intended, I thought proper to purſue the Deſign I had formed before ſeeing the ſaid Work. I muſt acknowledge however, that the above* Syſtem *has afforded me ſome uſeful Hints towards compoſing this Tract, and in particular the Doctrine of* Circulating Decimals *is chiefly ab-*

ſtracted therefrom, with, I think, ſome little Emendations, &c. *which a Man of the Author's Abilities might not attend to.*

Having thus touched on the general Scope of the Work, the next Thing is to inform the Reader that in proſecuting it, I have in the firſt Place ſhewn in the plaineſt Manner I could, how the Rules of DECIMAL ARITHMETIC, viz. Addition, Subtraction, Multiplication, Diviſion, *and* Reduction, *are performed; and in Reduction, beſides the common Methods by Arithmetical Operations, I have ſhewn how it may be facilitated by Means of Tables; and particularly have contrived a Method, by which the Tables for turning the lower Species of* Money, Weights, *&c.* into a Decimal, *ſerve alſo for finding the* Value of a Decimal *in the known Parts of its* Integer, *near enough to anſwer any Purpoſe in Buſineſs.*

In the next Place, by the Application *of this* Art, *I have ſhewn firſt, that it is very uſeful in the* common Rules of Arithmetic *in general; but more particularly in the Rule of* Practice, *which* Decimals *greatly facilitate.*

In applying them *to the* Computation of Exchanges, *which I have treated of very fully, I have ſometimes worked entirely by Decimals; and ſometimes (when it has been the ſhorteſt Way) uſed them as Auxiliaries only; I have notwithſtanding given ſuch general Methods, that the Learner may know which is the beſt Way of working any Queſtion of that Kind; and have ſhewn not only* ſhort *and* new *Methods of computing Exchanges, but alſo the* Par *of the* Exchange *between* London *and thoſe Countries we exchange with, and likewiſe the* intrinſic Value *of their* Monies, *both* *which, I believe, will be found more correct than in any Book extant. For among other Authors, I have found One that has written a Volume chiefly on Exchanges (not to ſay any Thing of the whole) very erroneous in this Point, notwithſtanding his Book has gone through ſeveral Editions. For my own Part, I have been at ſome Pains to be informed in many Particulars concerning them: yet if any Errors are committed in any thing advanced in relation thereto, I hope they will be excuſed, and ſhall eſteem it a Favour to be better informed.*

In Intereſt, *the ſhorteſt Methods of computing it, as well as the Knowledge of Exchanges, being very uſeful to the* trading Part of the World, *I have therefore ſhewn how* Intereſt, Simple *and* Compound, *may be be computed by the* Pen, *and alſo by* Tables. *In computing Intereſt by the Pen, I have given ſuch conciſe Methods as will fully convince the intelligent Reader of the great Uſefulneſs of* Decimals *therein*; *and as to* Simple Intereſt *in particular, I have by a* Decimal Table, *calculated* only at 5 per Cent. *ſhewn how the Simple Intereſt of any Sum to* 10000l. *at the uſual Rates* per Cent. *may be as readily found, as by* common Tables *of Intereſt, which would require (if calculated at* 3, $3\frac{1}{2}$, *&c. to* 5 per Cent.*) no leſs than fifteen times the Compaſs in which it is here included.*

As to the general Rules for ſolving Queſtions *relating to* Annuities *at* Compound Intereſt, *as they are very intricate, and the Reaſon of them is not to be comprehended but by an Algebraiſt, I have therefore omitted them; but in their Stead have ſhewn how the moſt uſeful Queſtions in regard to finding the* Amount of Annuities in Arrears, *and* the preſent Worth of Annuities, *&c. are eaſily anſwered by Tables. Theſe with*

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with the other Tables of Intereſt, I have not only ſhewn how to uſe, *but alſo the* Manner *and* Reaſon *of their* Conſtruction, *in order to give the Learner a better Inſight into the whole Buſineſs of Compound Intereſt. As to the Tables themſelves, great Care has been taken to make them correct: Thoſe of Compound Intereſt, not being taken from any Author without a previous Examination of every Number, and the Tables of Simple Intereſt are calculated entirely by myſelf.*

Paſſing over Annuities on Lives, *I have in the laſt Place given the Doctrine of* Circulating *or* Repeating Decimals, *called* Repetends; *the Knowledge of* theſe *indeed is not abſolutely neceſſary in ordinary Computations, but as they are ſometimes uſeful even in them, and moreover may be acceptable to thoſe whoſe Curioſity may excite them to know the Management of Repetends, I have therefore treated of them, with their Uſe,* &c.

Beſides what has been already mentioned, many uſeful Things *will be found in this Work, not neceſſary to be here particularized. I ſhall therefore only add, after entreating the Reader's candid Peruſal of it, that I have endeavoured throughout the whole, as much as could be, to make uſe of ſuch Kind of Queſtions as are moſt likely to occur in the common Tranſactions of* Trade *and* Buſineſs; *for it may be ſuppoſed, that thoſe who are deſigned for, or engaged in Buſineſs, have not much Time to ſpend about abſtruſe Queſtions, or Studies more curious than uſeful. The Mind indeed had better be ſo employed than to become enervated by Indolence: And therefore the ſolving difficult* Queſtions, *or rather the Study of the* Mathematics, *to which may be added Thoſe of a more ſpeculative Nature, are not to be diſcountenanced, but on the contrary, deſerve the higheſt Encomiums,*

miums, when purſued by Men of Leiſure *and* Fortune; *but as for the* Man of Buſineſs, *it may be obſerved, that*

——" Not to know at large of Things remote
" From Uſe, obſcure and ſubtle; but to know
" That which before *him* lies in daily life,
" Is the prime Wiſdom."————

ERRATUM.

Laſt Line, *p.* 207. read, *the Amount of Annuities in Arrears.*

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THE

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THE
INTRODUCTION.
CONCERNING
FRACTIONS in general.

A *Fraction* ſuppoſes an *Unit*, or one Whole of any Thing to be divided into a certain Number of equal Parts, and is intended to expreſs a Part or Parts of that *Unit* ſo divided. And

FRACTIONS are of two Kinds, *Vulgar* and *Decimal.*

I. A *Vulgar Fraction* is expreſſed by two Numbers placed one above the other with a Line drawn between them,

$$\text{Thus,}\left\{\frac{3}{4}\begin{array}{l}\textit{Numerator.}\\ \textit{Denominator.}\end{array}\right.$$

The *Denominator*, or Number placed underneath the Line, denotes how many equal Parts the Thing is ſuppoſed to be divided into, (*being only the Diviſor in Diviſion.*) And the *Numerator*, or Number placed above the Line, ſhews how many of thoſe Parts are contained in the *Fraction: (It being the Remainder after Diviſion.)*

In reading *Fractions*, (both *Vulgar* and *Decimal*) the *Numerator* is firſt mentioned, then the *Denominator*; thus $\frac{3}{4}$ is read three Fourths; $\frac{11}{12}$ is read eleven Twelfths; $\frac{9}{10}$ is read nine Tenths; $\frac{85}{100}$ is read eighty five Hundredths; and $\frac{38}{745}$ is thirty eight Seven hundred and forty fifths; or thirty eight Parts in ſeven hundred and forty five. When a *whole Number* ſtands before a *Fraction*, as $27\frac{5}{14}$, it is read twenty-ſeven, and five Fourteenths; and $76\frac{14}{100}$ is read 76, and 14 Hundredths; and $35\frac{120}{231}$ is 35, and a hundred and twenty Parts in two hundred and thirty one, &c.

2. A *Decimal Fraction* is an artificial way of ſetting down and expreſſing of a natural or vulgar Fraction, as whole Numbers: And whereas the Denominators of *vulgar* Fractions are diverſe, the Denominators of *decimal* Fractions are always certain: For a decimal Fraction hath always for its Denominator an Unit, with as many Cyphers annexed to it as there are Places or Figures in the Numerator, and muſt therefore be either 10, 100, 1000, 10,000, &c. and therefore there is no Occaſion for writing it down, the uſual Way of expreſſing a Decimal being by ſetting a Point before the Numerator: Thus this decimal Fraction $\frac{25}{100}$ is written .25, its Denominator being known to be an Unit with two Cyphers, becauſe there are two Figures in the Numerator: Thus alſo $\frac{125}{1000}$ is written .125; $\frac{3575}{10000}$ is .3575; and $\frac{75}{1000}$ is written .075; and $\frac{65}{10000}$ is .0065.

A whole Number with a decimal Fraction, as $276\frac{14}{100}$, is thus expreſſed 276.14; and $74\frac{6}{1000}$ thus, 74.006, &c. And when a whole Number and a Decimal ſtand thus together, it is called a *mixed Number.*

As *Whole Numbers* increaſe in a decuple or tenfold Proportion, towards the left Hand, ſo, on the contrary, *Decimals* decreaſe towards the right Hand in a decuple Proportion, as in the following Table.

In Integers.	Thus, -	1	=	One, or Unity.
		10	=	Ten, or ten Units.
		100	=	One hundred.
		1000	=	One thouſand.
		10000	=	Ten thouſand.
		100000	=	One hundred thouſand.
In Decimals.	*Vice verſa.*	.1	=	One tenth Part of an Unit.
		.01	=	One hundredth Part.
		.001	=	One thouſandth Part.
		.0001	=	One ten thouſandth Part.
		.00001	=	One hund. thouſandth Part.
		.000001	=	One mill. Part of an Unit, &c.

Hence it appears, that as *Whole Numbers* are *increaſed* in a decuple Proportion by affixing Cyphers, ſo *Decimals* are *decreaſed* in the ſame Proportion by Cyphers being prefixed to them; thus .25, if a Cypher be prefixed to it, becomes $\frac{025}{1000}$ or .025; and .125, by prefixing 2 Cyphers, becomes $\frac{00125}{100000}$ or .00125. And therefore, in writing a Decimal Fraction, whoſe Denominator hath more Cyphers than there are Figures in the Numerator, they muſt be ſupplied by prefixing a Cypher or Cyphers thereto, to make them equal; thus, ſuppoſe $\frac{19}{1000}$ were to be written down without its Denominator; here the Denominator having 1 Cypher more than there are Figures in the Numerator, a Cypher muſt be prefixed to the Numerator, and the Decimal expreſſed thus .019.

Again, as Cyphers on the left Hand of Whole Numbers do not alter their Value, ſo Cyphers being annexed to the Right-hand of Decimals, do neither increaſe nor decreaſe the Value thereof; for $\frac{2500}{10000}$ is equivalent to $\frac{25}{100}$ or .25. Hence then, Cyphers may, at any Time, be annexed to the Right-hand of Decimals at Pleaſure.

In all *Decimal Numbers*, if the Point of Diſtinction be removed one Place towards the *Right-hand*, every Figure, and conſequently the whole Expreſſion, will be increaſed in a tenfold Proportion; as in the following Numbers 3.756, 37.56, 375.6, 3756, which are each one 10 Times greater than the preceding one. In which Proportion alſo, 'tis manifeſt they decreaſe in Value, by removing the Decimal Point a Place to the *Left-hand*.

The Nature and Properties of *Decimal Numbers*, and the Method of working them (except *Repetends*, treated of in the 10th *Chap.*) being the ſame with thoſe of *Integers* or *Whole Numbers*, renders *Decimal Arithmetic*, not only of infinite Service in *Menſuration*, *Gauging*, and many other Branches of the *Mathematics*, but alſo (when properly applied) of great Uſe in various Computations that occur in the Courſe of Trade and Buſineſs, as will appear in the following Work.

For the more convenient ordering of Queſtions according to the ſeveral Varieties that happen in Computations, it is become common in Books of Arithmetic, &c. to uſe the following *Signs* or *Characters*, as being a much ſhorter,

ter, better, and more ſignificant Way of denoting what is to be done (in moſt Operations) than can otherways be expreſſed in Words at Length. I have therefore made uſe of them in this Treatiſe, which, with their Significations, are as follow.

Signs.	*Names.*	SIGNIFICATIONS.
$+$	*Plus*, or *more.*	The Sign of *Addition*; as $8+7$ is 8 more 7, and ſignifies that the *Numbers* 8 and 7 are to be added together.
$-$	*Minus* or *leſs.*	The Sign of *Subtraction*; as $9-6$ is 9 leſs 6, and ſignifies that 6 is to be taken from 9.
$\times$	*Multiplied into* or *by*	The Sign of *Multiplication*; as 9×6 is 9 multiplied into or by 6.
$\div$	*Divided by*	The Sign of *Diviſion*; as $8\div2$, is 8 divided by 2: alſo thus 2)8(4 which ſignifies the ſame Thing.
$=$	*Equal to*	The Signs of *Equality*; as $9=9$, or $9+6=15$, or $9-6=3$. That is, 9 is equal to 9, or 9 more 6 is equal to 15, and 9 leſs 6 is equal to 3, *&c.*
: : :	*Is to,* *So is,*	The Signs of *Proportion*, or *Rule of Three*, thus 2 : 8 : : 6 : 24 are to be read, as 2 is to 8, ſo is 6 to 24.

CHAP.

CHAP. I.

Of *Addition*, *Subtraction*, *Multiplication*, *Diviſion*, *and Reduction of* DECIMALS.

SECT. I. *Addition of* DECIMALS.

THE Numbers to be added muſt be placed Units under Units, and Tens under Tens, as in Whole Numbers, and the decimal Points muſt ſtand under each other, with the Decimals annexed; then add as in common Addition, and from the Sum point off ſo many Places for Decimals as are equal to the greateſt Number of Decimal Places in any of the given added Numbers.

Examp. 1. Let 7.35, 26.324, 253.4, 46.5485, and 7.58 be added together in one Sum.

7.35
26.324
253.4
46.5485
7.58

Sum 341.2025

Examp. 2. Let 84.72, 856, 745.5, .647, and 78.0052 be added together.

84.72
856.
745.5
.647
78.0052

Sum 1764.8722

Theſe Examples are ſo plain, that more I think are needleſs.

SECT.

SECT. II. *Subtraction of* DECIMALS.

The ſame Directions being obſerved for placing the Numbers in Subtraction, as in Addition, it is likewiſe performed the ſame as in Whole Numbers.

EXAMPLES.

	(1)		(2)
From	24.327	From	.043
Subtract	17.432	Subtract	.005
Remains	6.895	Remains	.038

	(3)		(4)
From	587.64	From	482.
Subtract	29.4856	Subtract	.745
Remains	558.1544	Remains	481.255

Note, the vacant Places in the two laſt Examples are ſuppoſed to be ſupplied with Cyphers.

SECT. III. *Multiplication of* DECIMALS.

In Multiplication of Decimals, work the ſame alſo as in Whole Numbers, and from the Product point off as many decimal Places as are both in the Multiplicand and Multiplier.

EXAMP-

EXAMPLES.

Multiply	3.685	Multiply	672.5
by	2.75	by	.365
	18425		33625
	25795		40350
	7370		20175
Product	10.13375	Prod.	245.4625

If there are not in the Product ſo many decimal Places as there are in the Multiplicand and Multiplier, prefix Cyphers to equal that Number.

EXAMPLES.

Multiply	.10358	Multiply	1.0004
by	.103	by	.00013
	31074		30012
	10358		10004
Product	.01066874	Prod.	.000130052

When any Decimal Number is to be multiplied by 10, 100, 1000, 10000, &c. it is done by only moving the decimal Point, 1, 2, 3, or 4 Figures, &c. to the right Hand; thus, 27.52 multiplied by 10 is 275.2; the ſame Number multiplied by 100 is 2752; the ſame multiplyed by 1000 is 27520; and the ſame multiplied by 10000, the Product is 275200. &c.

Con-

Contracted Multiplication of DECIMALS.

When it happens that the Places of Decimals run far in both *Factors*, and conſequently would make a very large Decimal in the Product, in ſuch Caſe the Work may be contracted to as few Places of Decimals in the Product as you pleaſe, or is ſuitable to your Deſign, (three or four Places being generally ſufficient;) to do which, obſerve the following

RULE.

Set the *Unit's* Place of the *Multiplier* directly under *that Figure* of the decimal Part of the Multiplicand, *whoſe Place* you would preſerve in the Product.

Then invert, or place all the other Figures of the Multiplier, in a contrary Order to the common Way.

Laſtly, in multiplying always begin at the Figure of the Multiplicand which ſtands over the Figure wherewith you are then multiplying, ſetting down the firſt Figure of each particular Product directly under one another. But withal take Care to ſee what Increaſe would ariſe from the multiplying of the two next Right-hand Figures of the Multiplicand, which you muſt conſtantly add to the firſt Figure in every Product; that is, if the Product of the next Right-hand Figure (with as many Units added to it as there are Tens in the Product of the ſecond Right-hand Figure) be 5, or upwards to 10, you muſt add or carry 1; if it be 15 or upwards to 20, you muſt carry 2; and if 25 or upwards to 30, you muſt carry 3, &c.

EXAM-

EXAMPLE I.

Let 8.74694 be multiplied by 4.5276, and let there be only 4 *Places* of Decimals retained in the Product.

Place them as before directed, and they will ſtand

Thus,	8.74694	The Multiplicand as uſual.
	6725.4	The Multiplier inverted.

34.9878
4.3735
.1749
612
52

Product 39.6026

Here as 4 decimal Places are to be pointed off in the Product, the *Unit*'s Place of the *Multiplier*, is placed under the *fourth* decimal Place of the *Multiplicand.*

The Reaſon of, and how great a Part of the Work is ſaved by, this Contraction, will appear from the Operation at large.

8.74694
4.5276

52	48164
612	2858
1749	388
43734	70
349877	6
39.6026	45544

Hence it appears that all the Figures on the Right-hand of the Line are wholly omitted in the above Contraction, where the Product to 4 decimal Places is the ſame with this.

EXAMPLE II.

Multiply 576.24768 by 18.5724, and point off 4 *decimal Places* in the Product. Likewise multiply the ſame Numbers together, and point off *one Place* of Decimals.

1. For 4 decimal Places in the Product.

576.24768
4275.81

5762.4768
4609.9814
288.1238
40.3373
1.1525
.2305

10702.3023 the Product

2. For 1 decimal Place in the Product.

576.24768
4275.81

5762.5
4610.0
288.1
40.3
1.2
.2

10702.3 the Prod.

EXAMPLE III.

Multiply 694.6984 by .76852 to 3 *decimal Places* in the Product, and alſo to 1 *Place* of Decimals.

694.6984
25867.0

486.289
41.682
5.558
.347
14

533.890 the Prod.

694.6984
25867.0

486.3
41.7
5.6
.3

533.9 the Product.

The Multiplier in the laſt Example being an entire Decimal, the Place of Units is ſupplied with a Cypher.

Theſe *Contractions* will be found very uſeful, and a little practice will render them eaſy.

SECT. IV. *Diviſion of* DECIMALS.

Diviſion of Decimals is performed after the ſame Manner as Diviſion of whole Numbers, but the chief Difficulty is, how to diſcover the Value of the Quotient, that is, how to ſeparate the Integers from the Decimals, which however may readily be done, by due Obſervance of either of the following Rules, *viz.*

Rule 1. The *firſt Figure* in the Quotient is always of the ſame Value or Denomination with *that Figure* of the Dividend, under which the *Unit's Place* of its Product ſtands. Or thus;

Rule 2. The *decimal Parts* in the Diviſor and Quotient, muſt be always *equal in Number* to *thoſe* of the Dividend.

From this laſt Rule may be deduced theſe four uſeful Directions, *viz.*

Direct. 1. Point off as many decimal Places in the Quotient as there are in the Dividend more than in the Diviſor: Hence if the Diviſor be a whole Number, the decimal Places in the Dividend and Quotient will be equal.

Direct. 2. If the Diviſor is a whole Number, and has a Cypher in the Place of Units, ſuch Cypher may be cut off or cancelled, and in conſequence thereof, the Quotient muſt have one Place of Decimals more than the Dividend.

Direct. 3. If the Dividend has not ſo many decimal Places as the Diviſor, Cyphers muſt be annexed to make them equal, and whenever the decimal Places in the Diviſor and Dividend are equal, the Quotient will be whole Numbers.

Direct. 4. If after Diviſion is finiſhed there are not ſo many Figures in the Quotient, as there are decimal Places in the Dividend more than in the Diviſor, ſuch Defect muſt be ſupplied by prefixing Cyphers.

Beſides theſe Directions (deduced from the 2d general Rule) it is neceſſary to add the two following, *viz.*

Direct. 5. If there are more Figures in the Diviſor than in the Dividend, (whether in whole or mixed Numbers) a Cypher or Cyphers muſt be annexed to it, and the Cyphers thus added muſt be reckoned as Decimals. See 2d *Examples* of the 1ſt and 3d *Caſe.*

Direct. 6. In dividing either whole, mixed, or decimal Numbers, if there be a *Remainder*, (which is generally the Caſe) you may after pointing off the Quotient (as before directed) bring down Cyphers, and continue the Diviſion to as many Places of Decimals in the Quotient as you pleaſe, but three or four decimal Places are in general ſufficient.

I ſhall endeavour to illuſtrate and explain the Whole by the following Examples.

CASE I.

Wherein the *decimal Places* in the Dividend *exceed* thoſe of the Diviſor.

Example 1. Divide 822 by 24.

```
24)822.(34.25  the Quotient.
   72
   ---
   102
    96
   ---
     60
     48
    ---
     120
     120
     ---
     ...
```

In this Example before the Cyphers are brought down the Quotient is 34, but there being a Remainder of 6, I firſt place the decimal Point on the Right-hand of the 34. and then by *Direct.* 6. continue the Quotient by bringing down Cyphers, and had there been ſtill a Remainder, it might have been continued to 4 decimal Places, as in the next Example.

Note, The Cyphers are ſaid to be brought down, becauſe they are always ſuppoſed to be placed at the Right-hand of the Dividend.

Examp. 2. Divide 67 by 287.

```
287)67.0(.2334  Quotient.
    574
    ———
     960
     861
     ———
      990
      861
      ———
      1290
      1148
      ————
       142
       ———
```

In this Example there being more Figures in the Diviſor than in the Dividend, a Cypher is annexed to it, by *Direct.* 5; then 287 in 67.0 is twice, which 2 is firſt pointed off for a Decimal by *Direct.* 1. and then by *Direct.* 6. the Quotient is continued to 4 Dec. Places, as in the Work.

Examp. 3. Divide 476.23 by 27.

```
27)476.23(17.6381  Quotient.
   27
   ———
   206
   189
   ———
    172
    162
    ———
     103
      81
     ———
      220
      216
      ———
        40
        27
        ——
        13
```

In this Example, after bringing down all the Figures in the Dividend, I point off two decimal Places in the Quotient by *Direct.* 1. and then continue it to 4 decimal Places by bringing down Cyphers.

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Examp. 4. Divide 2754.385 by 960.

```
96|0)2754.385(2.8691
     192
     ---
      834
      768
      ---
       663
       576
       ---
        878
        864
        ---
         145
          96
         ---
          49
```

Here the Cypher is cut off in the Diviſor, and the Decimals pointed off in the Quotient by *Direct.* 2.

When the Diviſor is a *ſingle Digit*, the Quotient may be placed under the Dividend, and the decimal Points will be under each each other. See the next Example.

Examp. 5. Divide 757.35 by 4.

```
4)757.35
  ------
  189.3375  the Quotient.
```

In this ſhort Diviſion (for ſo it may properly be called) Cyphers are always ſuppoſed to be annexed, to fill up the vacant Places in the Dividend.

When the Diviſor is 20, 30, 40, &c. you may alſo divide as above, only place the decimal Point in the Quotient one Figure backward, as in the following Example.

Examp. 6. Divide 734.6737 by 80.

8|0)734.6737

9.18342 the Quot.

It often happens that Division may be performed after this ſhort Manner, when the Diviſor has 2 *Digits*, as in the two next Examples.

Examp. 7. Divide 476.23 by 27.

$$27\begin{cases}3)476.23\\9)158.7433\end{cases}$$

Quotient 17.6381

I divide here by 3, and then by 9, becauſe 3×9=27, the Diviſor,

Examp. 8. Divide 2754.385 by 960.

$$120\times8=960\begin{cases}12|0)2754.385\\8)\ 22.9532\end{cases}$$

2.8691 the Quotient.

The two laſt Examples are only a Repetition of *Examp.* 3d and 4th, by which the Learner may ſee the Advantage of this Kind of Diviſion, (when it can be uſed) the Uſefulneſs of which will further appear hereafter, particularly in *Reduction* of Decimals and the Rule of *Practice*.

In the foregoing Examples, the Dividend only has had decimal Places, all the Diviſors being whole Numbers, but the following have Decimals in both Dividend and Diviſor.

Examp. 9. Divide 756.5784 by 23.4.

```
23.4)756.5784(32.332
     702
     ———
      545
      468
      ———
       777
       702
       ———
        758
        702
        ———
         564
         468
         ———
          96
```

Here three decimal Places are pointed off in the Quotient, by *Direct.* 1.

Examp. 10. Divide 745.3678 by 27.52, and let there be 5 decimal Places in the Quotient.

```
27.52)745.3678(27.08458
      5504
      ————
      19496
      19264
      —————
        23278
        22016
        —————
         12620
         11008
         —————
          16120
          13760
          —————
           23600
           22016
           —————
```

In this Example, after bringing down all the Figures in the Dividend, 2 decimal Places are pointed off in the Quotient, (by *Direct.* 1ſt,) and then it is continued as in the 3 firſt Examples.

CASE

CASE II.

When there are *not ſo many decimal Places* in the Dividend as in the Diviſor.

Example 1. Divide 113.4 by .4725.

```
.4725)113.4000(240.
          9450
         ------
          18900
          18900
         -------
          .....0
```

Here Cyphers are annexed to the Dividend, to anſwer the decimal Places of the Diviſor, that the Quotient might be whole Numbers, by *Direct.* 3.

Examp. 2. Divide 53.2 by 2.757.

```
2.757)53.200(19.2963
      2757
     ------
      25630
      24813
     -------
        8170
        5514
       ------
        26560
        24813
       -------
         17470
         16542
        -------
          9280
          8271
         ------
```

Cyphers are here annexed to the Dividend, and the decimal Point in the Quotient is placed at the Right-hand of the Integers, as in the laſt Example, and then the Quotient is continued as uſual.

CASE III.

When after Diviſion is finiſhed, there are *not ſo many Figures* in the Quotient as there are *decimal Places* in the Dividend *more* than in the Diviſor.

Examp. 1. Divide .0020091 by .543.

```
.543).0020091(.0037
        1629
       ------
        3801
        3801
       ------
        ....
```

Here 2 Cyphers are prefixed in the Quotient by *Direct.* 4.

Examp. 2. Divide 2.38 by 5472, and let there be 5 *decimal Places* in the Quotient.

```
5472)2.3800(.00043
       21888
      -------
        19120
        16416
      -------
```

In this Example I annex Cyphers to the Dividend, by *Direct.* 5; then 5472 in 2.3800 is 4 Times; to the 4 in the Quotient I prefix Cyphers, (as in the laſt Example) and then in Order to have 5 *decimal Places* therein, bring down a Cypher as uſual.

All theſe particular Directions for finding the Value of, or pointing off the Quotient, will be found to agree with the 1ſt *General Rule*, (Page 11.) For Inſtance; in *Examp.* 3. *Caſe* 1. the *Unit*'s Place of the Diviſor, falls under the Place of *Tens* in the Dividend; and therefore the firſt Figure in the Quotient is *Tens:* And in *Examp.* 4. the *Unit*'s Place of the Diviſor (had it not been cut off) would have fallen under the *Unit*'s Place in the Dividend, and therefore the firſt Figure in the Quotient is *Units.* Again, in *Examp.* 10. the *Unit*'s Place of the Diviſor falls under the Place of *Tens* in the Dividend, and therefore the firſt Figure in the Quotient is *Tens:* And in the 1ſt *Examp.* of 3d *Caſe*, the *Unit*'s Place (had there been any) would have fallen under the Place of *Thouſandths* in the Dividend, and therefore the firſt Figure in the Quotient is *Thouſandths.*

Note, This Manner of finding the Value of the Quotient (by *Rule* 1.) is particularly uſeful in *Contracted Diviſion*, as will appear hereafter.

It was obſerved in *Multiplication*, that multiplying by 10, 100, 1000, &c. was only moving the decimal Point 1, 2, or 3 Figures, &c. to the Right-hand; on the contrary, dividing by 10, 100, 1000, &c. is only moving the decimal Point, 1, 2, or 3 Figures, &c. to the Left-hand; thus 27.52 divided by 10, the Quotient is 2.752; the ſame divided by 100, the Quotient is .2752; the ſame divided by 1000, the Quotient is .02752; and if divided by 10000, the Quotient would be .002752, &c.

It may ſometimes happen that the Product of a *Multiplication Sum* may be ſooneſt obtained by *Diviſion*; and on the contrary, the Quotient of a *Diviſion Sum* by *Multiplication*. For Inſtance,

Suppoſe the Product of 7315×125 was required.

To do this or any Sum in *Multiplication* by *Diviſion*; divide an Unit with Cyphers annexed by the Multiplier, and the *Quotient* will be the *Diviſor*: Thus,

Given Multiplier 125)1.000(.008 the Diviſor ſought.
1 000

. . . .
Then .008)7315.000

The Quotient 914375 = 7315×125,
as appears by multiplying.

7315
125
36575
14630
7315
Prod. 914375

Again, let the *Quotient* be required of 914375 divided by 125.

To do this, or any Sum in *Diviſion* by *Multiplication*, divide an *Unit* with Cyphers annexed by the *Diviſor*, and the *Quotient* will be the *Multiplier*: Thus,

125)1.000(.008 the *Multiplier*.
1 000
. . . .

Then multiply 914375
by .008

The Product 7315.000 =914375÷125, as is evident from the laſt Example, this being the *Converſe* of it.

Diviſion of DECIMALS *contracted.*

In Diviſion of Decimals the common Way, when there are many decimal Places in the Diviſor, the Operations will often be long and tedious, but the Work may be very much contracted by the following

R U L E.

The Value, or Denomination of the firſt Figure in the Quotient being determined by the *firſt general Rule*, you may have what Number of decimal Places you pleaſe, by taking *as many* of the Left-hand Figures of the Diviſor as you intend to have *Figures* in the *Quotient* for the firſt Diviſor, and then take *as many* Figures of the Dividend as will anſwer them, and in dividing, omit, or point off, one Figure of the Diviſor at each following Operation, ſtill having a due Regard to the Increaſe which would ariſe from the Figure and Figures ſo omitted.

Examp. Divide 75.18364 by 2.62842, and let 3 *decimal Places* be in the Quotient.

The following is the Work *contracted* and alſo at *large*, whereby it appears that all the Figures on the Right-hand of the Line, in the Operation at large, are wholly omitted in the ſame contracted.

The Work contracted.	The ſame at Length.
2.6284|2)75.183|64(28.604	2.62842)75.18364(28.604
.... 52568	52568|4
22615	22615|24
21027	21027|36
1588	1587|880
1577	1577|052
11	10|82800
11	10|51368
	|31432

In this Example the *Unit's* Place of the Diviſor falls under the Place of *Tens* in the Dividend, and it is required that 3 Places of Decimals be in the *Quotient*, ſo there muſt be 5 Places in all, that is, 2 Places of whole Numbers, and 3 Places of Decimals; then (in the contracted Operation) I take the 5 Left-hand Figures for the *firſt* Diviſor, cutting off the 2; and the 64 in the Dividend being uſeleſs, is cut off alſo; then I proceed as in the Work, which I preſume needs no further Explanation.

MORE EXAMPLES.

Divide 5171.59165 by 8.758615, and let 4 *decimal Places* be in the Quotient.

```
8.758615)5171.5916|5(590.4577
   ......43793075
         --------
          7922841
          7882754
          -------
            40087
            35034
            -----
             5053
             4379
             ----
              674
              613
              ---
               61
               61
               --
```

Divide 42.1764 by 314.2543, and let it be required, that 5 *Places* of *Decimals* be in the Quotient.

```
314.25|43)42.176|4(.13421
  ....     31425
           -----
           10751
            9428
           -----
            1323
            1257
            ----
              66
              63
              --
               3
               3
               -
```

It is ſometimes requiſite to have 3 or 4 Figures more or leſs in the Quotient, before you begin to point off the Figures in the Diviſor in order to contract the Work, as in the following Examples; in both which it is ſuppoſed neceſſary to have 5 *decimal Places* in the Quotient.

```
2.756756)7414.76717(2689.67118
 ......  5513512
         -------
         19012551
         16540536
         --------
          24720157
          22054048
          --------
           2666109
           2481080
           -------
            185029
            165405
            ------
             19624
             19297
             -----
               327
               276
               ---
                51
                28
                --
                23
                22
                --
                 1
```

```
7.587)527.271(69.49664
  ...  45522
       -----
       72051
       68283
       -----
        37680
        30348
        -----
         73320
         68283
         -----
          5037
          4552
          ----
           485
           455
           ---
            30
            30
            --
            ..
```

The ſame may be ſaid of theſe *Contractions* as of *thoſe* in Multiplication, that they are very uſeful, as they greatly ſhorten the Work in many *Computations.*

I have been the larger on this Rule of *Diviſion*, becauſe but little can be done in *Decimal Arithmetic*, without a perfect Knowledge of it.

SECT V. *Reduction of* DECIMALS.

In *Reduction* of Decimals are *three* Caſes.

Firſt, To reduce or bring a *vulgar Fraction* to a *Decimal.*

Secondly, To reduce any known Part or Parts of *Money, Weight, Meaſure*, &c. to a Decimal. By theſe two Caſes Queſtions are prepared for decimal Operation.

Thirdly, To find the Value of a Decimal, in the known Parts of *Money, Weight, Meaſure*, &c. This is the *Converſe* of the laſt Caſe.

CASE

CASE I.

To reduce a *Vulgar Fraction* to a *Decimal*.

Divide the *Numerator* by the *Denominator*, as if both were whole Numbers.

EXAMPLES.

What are the Decimals *equivalent* to the *Fractions* $\frac{1}{4}$, $\frac{1}{2}$, and $\frac{3}{4}$.

(1)

$4)1.00$

$.25$

(2)

$2)1.0$

$.5$

(3)

$4)3.00$

$.75$

Answer, $\frac{1}{4}=.25$, $\frac{1}{2}=.5$, and $\frac{3}{4}=.75$.

EXAMPLE IV.

Reduce $\frac{4}{7}$ to a *Decimal*.

$7)4.0$

The Dec. required, $.514285$

.571428

Cyphers are here ſuppoſed to fill up the vacant Place in the Dividend, as was obſerved in Diviſion.

If after the Quotient is continued to 4, 5, or 6 decimal Places, (agreeable to *Direct*. 6. in *Diviſion*) there be ſtill a *Remainder*, (as in the above Example) no further Notice is taken of it.

EXAMPLE V.

Reduce $\frac{3}{8}$ of *Pound Sterling* to the *Decimal* of a *Pound*.

$8)3.0$

$.375$ the Anſwer, *i. e.* £. $\frac{3}{8}$ = £. $.375$.

EXAMPLE VI.

Reduce $\frac{67}{287}$ of a *Pound* to the *Decimal* of a *Pound.*

$$\begin{array}{l} \qquad\quad\ \text{£.} \\ 287)67.0(.2334,\ \text{\&c. the Anſwer.} \end{array}$$

See the 2d *Example* of *Diviſion* for the Operation at large.

EXAMPLE VII.

Reduce $\frac{3}{48}$ of a *Hundred Weight* to the *Decimal* of a Hund.

$$6\times8=48\left\{\begin{array}{l} 6)3.0 \\ \hline 8)\ .50 \end{array}\right.\qquad \text{Anſwer}\ \ \overset{C.}{\frac{3}{48}}=\overset{C.}{.0625}.$$

$$\begin{array}{r} \hline .0625 \\ \hline \end{array}$$

EXAMPLE VIII.

Reduce $\frac{117}{156}$ of a *Pound Weight* to a *Decimal.*

$$\begin{array}{r} ℔ \\ 156)117.0(.75 \\ 1092 \\ \hline 780 \\ 780 \\ \hline \ldots \end{array}\qquad \text{the Anſwer.}$$

EXAM-

EXAMPLE IX.

Reduce $7\frac{3}{3496}$ *Hogſheads* into Decimals.

```
           Hd.          Hd.      Hd.
3496)3.0000(.000858, hence 7 3/3496=7.000858 the
     27968                               Anſwer.
     -----
      20320
      17480
      -----
       28400
       27968
       -----
```

CASE II.

To reduce any known Part or Parts of *Money*, *Weight*, *Meaſure*, &c. to a *Decimal*, there are *three* Ways or Methods, which are as follows.

Method 1. Firſt bring the *different* Species given into a *Vulgar Fraction*, by reducing them to the *loweſt* Denomination they conſiſt of for the *Numerator*, and reduce the *Integer* to the *ſame* Denomination for a *Denominator*; then bring the *Vulgar Fraction* to a Decimal. (By *Caſe* 1.)

Exam. 1. What *Decimal Part* of a *Pound* is 16 : 5¾ ? (s. d.)

Firſt, 16 : 5¾ = 791 Farth. (s. d.) the *Numer.* And the *Integer* 1 = 960 Farth. (l.) the *Denom.*

16	1
12	20
197	20
4	12
791	240
	4
	960

Then divide by 960=8×120 $\left\{\begin{array}{l} 8)791.0 \\ \hline 12|0)98.875 \end{array}\right.$

.82396 nearly, the Anſ.

That is 16 : 5¾ = $\frac{791}{960}$ = .82396 (s. d. l. l.)

Note, When the laſt Remainder is half or more than Half of the Diviſor, it is common to add 1 to the laſt Figure in the Quotient, as in the above Example, where the 12's in 70 is 5 Times, but the Remainder being 10, the laſt Figure in the Quotient is therefore 6.

In this, as well as the 1ſt *Caſe,* it is ſufficient to continue the Quotient only to 4, 5, or 6 Decimal Places.

Examp.

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Exam. 2. What Decimal Part of a *Pound* is 8 s. : $6\frac{3}{8}$ d.?

```
s.  d.            l.
8 : 6⅜            1  the Integer.
12                20
———               ———
102               20
  8               12
———               ———
819 Eigths of a Penny. 240
———                8
                  ———
                  1920  Eigths of a Penny.
                  ———
```

Then, 192|0)819.(.4265, &c. the Anſwer.

That is, 8 s. : $6\frac{3}{8}$ d. $=\frac{819}{1920}$ l. $=$ .4265 l., &c.

Exam. 3. What Decimal Part of a *Hundred Weight* is 3 Q. : 14 ℔.?

```
Q. ℔.                 C.
3 : 14                1  the Integer.
28                    4
———                   ———
98      Pounds.       4
                      28
                      ———
                      112  Pounds.
```

Then 112)98.0(.875 the Anſwer.

That is, 3 Q. : 14 ℔. $=\frac{98}{112}$ C. $=$ .875 C.

Note, If the Learner is not well acquainted with the *common* Tables of *Weights*, *Meaſures*, &c. let him conſult the Tables in the next ſection, by which he will ſee how many of the ſmaller Denominations are contained in the next greater, &c.

Exam.

C. q. ℔.
Examp. 4. What Decimal Part of a *Tun* Wt. is 15 : 1 : 27 ?

C. Q. ℔.
Firſt, 15 : 1 : 27 = 1735 *Pounds the Numerator.*
And 1 *Tun* = 2240 *Pounds the Denominator.*
Tun.
Then, 224|0)1735.(.7746 nearly, the Anſwer.

P.w. gr.
Examp. 5. What Decimal Part of an *Ounce Troy* is 12 : 3?

P.w. gr.
Firſt, 12 : 3 = 291 *Grains.*
And 1 oz. = 480 *Grains.*
Then 480 { 6)291.
8|0) 48.5 }

.60625 Oz. the Anſwer.

Oz. P.w. gr.
Ex. 6. What Decimal Part of a *Pound Troy* is 8 : 12 : 16?

Oz. P.w. gr.
Firſt, 8 : 12 : 16 = 4144 *Grains.*
And 1 Pound = 5760 *Grains.*
℔.
Then 576|0)4144.(.7194, &c. the Anſwer.

Hhd. Gal.
Examp. 7. What Decimal Part of a *Ton Wine* is 2 : 43?

H. G.
Firſt, 2 : 42 = 169 *Gall.*
And 1 *Ton* = 272
Ton.
Then 252)169.0).6706, &c. the Anſwer.

Exam.

Examp. 8. What Decimal Part of a *Year* is 235 *Days?*

Firſt, 235 Days is $\frac{235}{365}$ of Year,
Year.
And 365)235.0(.6438, &c. the Anſwer.

Method 2. Find what *Decimal* Part the *leaſt* Denomination of the given *Species*, is of the next *Superior*, to which prefix the given Part of the next *ſuperior* Denomination; then ſee what *Decimal* Part this *mixt* Number is of the next *ſuperior* Denomination, to which again prefix what is *given of it*; and thus proceed till you aſcend to the *Integer* itſelf, and find what *Decimal* Part of it the laſt *mixed Number* is, which will be that ſought.

The following are the *Examples* in the 1ſt *Method* repeated.

Examp. 1. What Decimal of *Pound* is 16 *s.* : $5\frac{3}{4}$ *d.*?

4)3.0
12)5.75
2|0)16.4792
Anſw. .82396 as before.

Here I divide firſt the 3 Farthings by 4, and the Quotient is .75, the Decimal of one Penny for 3 Farthings; to the .75 I next prefix 5 Pence, and the *mixed* Number 5.75 being divided by 12, the Quotient is .4792, the Decimal of one Shilling for $5\frac{3}{4}$ *d*; then to the .4792 I prefix 16 Shillings, and 16.4792 being divided by 20 the Quotient is .82396 *l.* nearly, the Anſwer.

This Example being underſtood, the following will need but little Explanation.

Examp. 2. What Decimal of a *l.* is 8 : 6⅜ ?

8)3.0

12)6.375 the Dec. of one Penny for ⅜ *d*, with 6 *d.* prefixed.

2|0)8.5312, &c. the Dec. of a Shill. for 6⅜ *d.* with 8 *s.* prefixed.

Anſw. .42656, &c. the Dec. of a Pound.

Qrs. ℔.

Examp. 3. What Decimal of a *Hundred Weight* is 3 : 14 ?

28 { 4)14.
 7) 3.5

4) 3.5 the Dec. for 14 ℔. with 3 *qrs.* prefixed,

Anſwer, .875 the Dec. of a C.

C. qrs. ℔.

Examp. 4. What Decimal of a *Ton Weight* is 15 : 1 : 27 ?

28 { 4)27.
 7) 6.75

4) 1.96428 the Dec. for 27 ℔. with 1 qr. prefixed.

2|0)15.49107 the Dec. for 1 qr. 27 ℔. with 15 C. prefixed.

Anſwer, .774553 the Dec. of a *Tun.*

P.w. gr.

Examp. 5. What Decimal of an *Ounce Troy* is 12 : 3 ?

$$24\begin{cases}4)3.0\\ 6)\ .75\end{cases}$$

2|0)12.125 the Dec. for 3 grs. with 14 P.w. prefixed.

Anſwer, .60625 the Dec. of an *Ounce.*

Oz. P.w. Gr.

Examp. 6. What Dec. of a *Pound Troy* is 8 : 12 : 16 ?

$$24\begin{cases}4)16.\\ 6)\ 4.0\end{cases}$$

2|0)12.6666 &c. the Dec. for 16 gr. with 12 P.w. prefixed.

12)8.63333 &c. the Dec. for 12 P.w. 16 grs. with 8 oz. prefixed.

Anſwer, .71944 &c. the Dec. of a *Pound.*

Hd. Gal.

Examp. 7. What Dec. of a *Ton Wine* is 2 : 43 ?

$$63\begin{cases}7)43.\\ 9)\ 6.1428\end{cases}$$

4) 2.6825 &c. the Dec. for 43 G. with 2 Hd. prefixed.

Anſwer, .6706 &c. the Dec. of a *Ton.*

Method 3. The *third* Method for finding the Decimal of any Part or Parts of *Money*, *Weight*, *Meaſure*, &c. is by *Tables* ready calculated for that Purpoſe.

This Method being the moſt eaſy and expeditious, I have therefore at the End of this *Chap.* inſerted ſome of the moſt uſeful *Decimal Tables*, by which the different Parts of *Money Weight*, &c. are with great Facility turned into Decimals. As to the Manner of uſing them (in this Reſpect, for I ſhall hereafter ſhew their Uſe in another) the following Examples (which are the ſame as before) will obviate.

s. *d.*
Examp. 1. What Dec. Part of a *l.* is 16 : 5¾ ?

In *Table* 1. of *Money*, you find against 16 Shil. the Decimal	.8
And in *Table* 2. againſt 5¾ *d.* the Decimal	.023958
The Sum is the Anſwer,	.823958

Qrs. ℔.
Examp. 2. What Decimal of a *Hundred Weight* is 3 : 14 ?

In *Table* 1. *Avoirdupois Weight one* C. the Integer, againſt 3 qrs. is - - -	.75
In *Table* 2. againſt 14 ℔. is - -	.125
The Anſwer,	.875

C. qrs. ℔.
Examp. 3. What Dec. of a *Ton Weight* is 15 : 1 : 27 ?

In *Table* 1. *Avoirdupois Weight one Ton* the Integer, againſt 15 C. is - -	.75
Table 2. againſt 1 qr. 27 ℔. is - -	.024554
Anſwer,	.774554

Examp.

P.w. gr.
Examp. 4. What Dec. of an *Ounce Troy* is 12 : 3 ?

In *Table* 1. *Troy Weight, one Ounce* the Integer.
Againſt 12 P.w. is - - .6
Table 2. Againſt 3 gr. is - - .00625

Anſwer, .60625

Oz. P.w. gr.
Examp. 5. What Dec. of a *Pound Troy* is 8 : 12 : 16 ?

In *Table* 1. *Troy Weight, one Pound* the Integer,
Againſt 6 oz. is - - .5
Table 2. Againſt 2 oz. 12 P.w. is .216666
Table 3. Againſt 16 gr. is .002778

Anſwer, .719444

Hd. G.
Examp. 6. What Dec. of a *Ton Wine* is 2 : 43 ?

In *Table* 1. *Wine Meaſure,* againſt 2 Hds. is .5
Table 2. Againſt 43 Gal. is .170635

Anſwer, .670635

Examp. 7. What Dec. of a *Year* is 235 *Days* ?

In *Table* 1. *Of Time,* againſt 200 Days is .547945
Table 2. Againſt 35 Days is .09589

Anſwer, .643835

Theſe Examples I preſume are abundantly ſufficient to ſhew the Method of uſing theſe Tables in turning the different Parts of Money, Weight, &c. to a Decimal. The Decimal indeed of ſome few Quantities may as readily be known without them; for inſtance, the Decimal of any Number of Shillings, ſuppoſing a Pound the Integer, is found by only taking the Half of them; thus the Half of 10 is .5, the Decimal of 10 Shillings; and the Half of 15 (ſuppoſing a Cypher annexed) is .75 the Decimal of 15 Shillings. In the ſame Manner may the Decimal of any Number of Nails be found, the Integer being an Ell Engliſh; thus the Decimal of 3 Nails is .15 of an Ell, and the Decimal of 3 Quarters and 3 Nails=15 Nails, is .75 of an Ell. In like Manner alſo the Decimal of any Number of Hundreds is known, the Integer being a Ton Weight. In ſhort, 'tis plain that by this Method the Decimal of any Vulgar Fraction, having 20 for its Denominator, is diſcovered, for the above Shillings, Nails, &c. may be conſidered as ſuch Fractions; thus 10 Shillings is equal to $\frac{10}{20}$, or .5 of a *l.* and 3 Nails is equal to $\frac{3}{20}$, or .15 of an Ell, &c.

CASE III.

To find the *Value* of a *Decimal*; or to *reduce* it into the known Parts of *Money*, *Weight*, *Meaſure*, &c.

RULE.

Multiply the given Decimal by the *Number of Units* contained in the next *lower* Denomination, and from the Product point off as many decimal Places as there are in the Decimal given; multiply theſe Decimal Places pointed off by the *Number of Units* contained in the next *lower* Denomination; and proceed after this Manner to the *loweſt* Denomination required, and the *whole Numbers* in the ſeveral Products, will be the ſeveral Parts of the Quantity ſought.

But it may be proper to obſerve, that it is *not always* neceſſary to reduce the given Decimal into the *very loweſt* Denomination of the reſpective *Weight*, *Meaſure*, &c. For it would be needleſs to reduce the Decimal of a Ton

Weight,

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Weight, to an Ounce, or a Dram; or the Decimal of a Ton of Wine to ſo ſmall a Quantity as a Pint, as the Weight in the one Caſe to a *Pound*, and the Meaſure in the other to a *Gallon*, may reaſonably be ſuppoſed to be exact enough to anſwer any Purpoſe in Buſineſs. This being premiſed, I ſhall next proceed to the Examples.

EXAMPLE I.

Reduce .78175 of a *Pound Sterl.* into the known Parts thereof.

.78175
20

s. 15 .63500
12

d. 7 .62000
4

q. 2 .48000

Here I multiply by 20, by 12, and by 4, agreeable to the above Rule, which produces the Anſwer, 15s. 7d. 2.48

That the laſt Example might be as plain as poſſible, I have multiplied the Cyphers on the Right-hand of the Products, but as Cyphers on the Right-hand of Decimals are of no Value, I ſhall therefore not multiply them when they occur in any of the following Examples.

EXAMPLE II.

Reduce .6023 of a *Pound Averdupois* into the known Parts thereof.

.6023
16

9.6368
16

10.1888

oz. dr.
Anſwer. 9 : 10.18 &c.

EXAM-

EXAMPLE III.

What's the Value of .6723 of a *Hund. Weight.*

4

2.6892

28

55136 qrs. ℔.

13784 Anſw. 2 : 19 .29 &c.

19.2976

EXAMPLE IV.

What's the Value of .6445 of a *Ton Weight?*

20

12.8900

4

3.56

28 C. qrs. ℔.

Anſw. 12 : 3 : 15.68

448

112

15.68

EXAM-

EXAMPLE V.

Reduce .4653 of a *Pound Troy* into the known Parts thereof.

12

5.5836

20

11.6720

24

2688

1344

16.128

	Oz.	P.w.	gr.
Anſwer,	5 :	11 :	16.128

EXAMPLE VI.

Reduce .6213 of a *Ton Wine* into *Hogſheads* and *Gallons*.

4

2.4852

63

14556

29112

30.5676

	Hd.	G.
Anſwer,	2 :	30.5 &c.

EXAM-

EXAMPLE VII.

Reduce .672 of a *Year* into *Days*.

365

3360
4032
2016

Anſwer, 245.280 Days.

It was ſhewn in the *laſt Caſe* how to turn the different Parts of *Money*, *Weight*, &c. into Decimals by *Tables* calculated for that Purpoſe; and as the Operations in this Caſe are ſomewhat tedious, Mr. *Marten*, in his *Syſtem of Decimal Arithmetic*, has inſerted a Set of Tables which he invented for the more eaſy finding the Value of any Decimal in the known Parts thereof. But I have here contrived a Method whereby the Tables for turning *into* Decimals, ſerve alſo to turn *out*, or to find the Value of a Decimal, (ſufficiently exact for Buſineſs) and that in the following eaſy and expeditious Manner.

Seek in the firſt of thoſe Tables where the *Integer* is of the *ſame* Denomination with the *Decimal whoſe Value is required*, for the *Decimal next leſs* to the *Decimal given*, which *ſubtract* from the ſame; and in the ſecond Table ſeek for the *Decimal* next leſs to the *Remainder*, and the Quantities anſwering to the Decimals thus found will be the Anſwer.

If there are three Tables to an *Integer* (but that is very ſeldom requiſite) as in *Troy Weight*, where the *Integer* is a Pound, firſt ſubtract the *Decimal* in the 1ſt Table *next leſs* to the given Decimal, and from the Remainder ſubtract the *next leſs* Decimal in the 2d Table.

The ingenious Practitioner may generally ſave himſelf the Trouble of applying to the 1ſt *Tables*; for, excepting the 1ſt Table of Avoirdupois Weight *one Pound* the Integer, and the 1ſt Table of Time; the Decimals in them, and the Quantities anſwering thereto, may with the leaſt Conſideration be known without referring to them. So that upon the Whole, this Method of finding the Value of a Decimal will be found both eaſy and expeditious, as will appear from the following Examples. (Which are a Repetition of the laſt.)

Note, In ſubtracting one Decimal from another, 4 Places of Decimals will be ſufficient, but if in taking out the Numbers from the Tables the 5th Figure be 5 or upwards, 1 may be added to the Figure preceding it.

EXAMPLE I.

What's the Value of .78175 of a *Pound Sterling*?

In *Table* 1. Of *Money*, you will find that the Decimal *next leſs* to the Decimal given is .75 equal in Value to 15 Shillings.

Then from .78175
Subtract .75 = 15 *s.*

Remains .0317 = $7\frac{1}{2}$ *d.* (nearly) the Value of the *next leſs* Decimal (.03125) as appears by *Table* 2d. Hence the Anſwer is 15 *s.* $7\frac{1}{2}$ *d.*

EXAMPLE II.

What's the Value of .6023 of a *Pound Avoirdupois*?

From .6023
Sub. .5625 = 9 oz. *per Table* 1. *Avoirdupois Weight, one Pound* the Integer.

Remains .0398 = 10 *Drams* nearly, by *Table* 2d.

Hence the Anſwer is 9 *Oz.* 10 *Dr.*

EXAMPLE III.

What's the Value of .6723 of a *Hundred Weight?*

From .6723
Sub. .5 =2 qrs. *per Table* 1. *Aveirdupois Weight, one C.* the Int.
Remains .1723=19 ℔. nearly, by *Table* 2.

Anſwer, 2 qrs. 19 ℔.

EXAMPLE IV.

What's the Value of .6445 of a *Ton Weight?*

From .6445
Sub. .6 =12 C. *per Table* 1. *Avoirdupois Weight, one Ton* the Int.
Remains .0445= 3 qrs. 15 ℔. nearly, by *Table* 2.

Anſwer, 12 C. 3 qrs. 15 ℔.

EXAMPLE V.

What's the Value of .4653 of a *Pound Troy?*

From .4653
Sub. .25 =3 oz. *per Table* 1, *Troy Weight*, 1 *Pound* the Int.
Remains .2153
From which ſubtract .2125=2 *oz.* 11 *P.w. per Table* 2.
Remains .0028 =16 *gr.* nearly, by *T.*3.

Hence the Anſwer is 5 oz. 11 P.w. 16 gr.

EXAMPLE VI.

What's the Value of .6213 of a Ton Wine?

From .6213
Sub. .5 = 2 *Hds. per Table* 1. *Wine Meaſure.*

Remains .1213=30 *Gallons* nearly, by *Table* 2.

Anſwer, 2 Hds, 30 Gal.

EXAMPLE VII.

What's the Value of .672 of a *Year?*

From .672
Snb. .5479=200 *Days, per Table* 1. *Of Time.*

Remains .1241= 45 *Days* nearly, by *Table* 2.

Anſwer, 245 Days.

Beſides the two general Methods in this Caſe for finding the Value of Decimals, there is ſtill a ſhorter Way than either of finding the Value of the Decimal of a *Pound Sterling*, (and without referring to any Decimal Table) the Uſefulneſs of which will fully compenſate for the little Difficulty there may be in the learning of it; for it may be obſerved, that the Value of the Decimal of a Pound *Sterl.* is more generally wanted in mercantile Computations, than the Value of all other Decimals of whatever Denominations, taken together.

This compendious Method is thus performed.

Double the firſt Figure, (or Place of Tenths), and it makes ſo many Shillings; and if the next Figure be 5, or more than 5, for the 5 add another Shilling to the former Shillings; then for every Unit in the ſecond Place count ten, and to that add the Figure in the third Place, and reckon that ſo many Farthings; but if they make above 13, abate 1; and if above 38 abate 2, and add the remaining Farthings to the Shillings before found.

Examp. What is the Value of .695 of a Pound *Sterl.*

First double the 6, and it makes 12 *s.* then take 5 out of 9, and for that reckon another Shilling, and it makes 13 *s.* and the four remaining is 4 Tens, which with the 5 make 45; this being above 38, abate 2, and the Remainder is 43 Farthings. So the Anſwer is 13 *s.* 10¾ *d.*

Note 1. If the Decimal whoſe Value is required contains more than *three* Places or Figures, and if the *fourth* Figure be 5 or upwards, another Farthing muſt be added, but if leſs than 5, no Notice need be taken of it.

2. If the Decimal has but *two* Places, a Cypher muſt be ſuppoſed to ſupply the *third* Place. Hence .31 of a *l.* muſt be reckoned .310, which by the above Rule comes to 6 *s.* 10½ *d.*

More *Examples*, with their Anſwers.

l.	*s.*	*d.*	*l.*	*s.*	*d.*	*l.*	*s.*	*d.*
.796 =	15 :	11	.4767 =	9 :	6½	.77 =	15 :	4¾
.654 =	13 :	1	.9489 =	18 :	11¾	.69 =	13 :	9½
.528 =	10 :	6¾	.0963 =	1 :	11	.08 =	1 :	7¼

SECT.

SECT VI. *Common* Tables *of* MONEY, WEIGHTS, MEASURES *and* TIME.

TABLE 1. *Money.*

Farthings,
4 = 1 *Penny,*
48 = 12 = 1 *Shilling,*
960 = 240 = 20 = 1 *Pound.*

TABLE 2. *Troy Weight.*

Grains,
24 = 1 *Pennyweight,*
480 = 20 = 1 *Ounce,*
5760 = 240 = 12 = 1 *Pound.*

By this Weight are weighed, *Jewels*, *Gold*, *Silver*, *Corn*, *Bread*, and all *Liquors*. The *Pound Troy* is divided by the *Apothecaries* as in the following Table.

TABLE 3. *Apothecaries' Weights.*

Grains,
20 = 1 *Scruple,*
60 = 3 = 1 *Dram,*
480 = 24 = 8 = 1 *Ounce,*
5760 = 288 = 96 = 12 = 1 *Pound.*

By theſe *Weights* the Apothecaries compound their Medicines, but buy and ſell their Drugs by *Avoirdupois Weight.*

TABLE 4. *Avoirdupois Weight.*

Drams,
16 = 1 *Ounce,*
256 = 16 = 1 *Pound,*
7168 = 448 = 28 = 1 *Quarter,*
28672 = 1792 = 112 = 4 = 1 *Hundred,*
573440 = 35840 = 2240 = 80 = 20 = 1 *Ton.*

By this Weight are weighed, *Tin*, *Steel*, *Iron*, *Lead*, &c. and all Goods that are ſubject to Waſte, as all Kinds of grocery Wares, alſo *Fleſh*, *Butter*, *Cheeſe*, *Salt*, &c.

N. B. It has been found by a nice Experiment that a *Pound Avoirdupois* is equal to 14 *Ounces* 11 *Pennyweight*, and 15½ *Grains Troy*, which expreſſed decimally is 1.215191 *Pound Troy*. Hence an *Ounce Avoirdupois* is equal to .911393 of an *Ounce Troy*, or 18 *Pennyweight*, and 5½ *Grains*, nearly.

TABLE 5. *Wool Weight.*

Pounds,						
7 =	1 *Clove*,					
14 =	2 =	1 *Stone*,				
28 =	4 =	2 =	1 *Todd*,			
182 =	26 =	13 =	6½ =	1 *Wey*,		
364 =	52 =	26 =	13 =	2 =	1 *Sack*,	
4368 =	624 =	312 =	156 =	24 =	12 =	1 *Laſt*.

Note, The Pound in this Weight is the ſame with the *Pound Avoirdupois*.

TABLE 6. *Wine Meaſure.*

Cub. Inches,							
28⅞ =	1 *Pint*,						
231 =	8 =	1 *Gallon*,					
9702 =	336 =	42 =	1 *Teirce*,				
14553 =	504 =	63 =	1½ =	1 *Hogſhead*,			
19404 =	672 =	84 =	2 =	1⅓ =	1 *Puncheon*,		
29106 =	1008 =	126 =	3 =	2 =	1½ =	1 *Butt or Pipe*,	
58212 =	2016 =	252 =	6 =	4 =	3 =	2 =	1 *Ton*.

By this Meaſure, all *Wines*, *Brandies*, *Spirits*, *Mead*, *Perry*, *Cyder*, *Vinegar*, *Oil* and *Honey*, &c. are meaſured.

TABLE 7. *Ale Meaſure.*

Cub. Inches.						
35¼ =	1 *Pint*,					
282 =	8 =	1 *Gallon*,				
2256 =	64 =	8 =	1 *Firkin*,			
4512 =	128 =	16 =	2 =	1 *Kilderkin*,		
9024 =	256 =	32 =	4 =	2 =	1 *Barrel*,	
13530 =	384 =	48 =	6 =	3 =	1½ =	1 *Hhd*.

Note, 8 Gallons is alſo a *Firkin* of *Soap* and *Herrings*.

TABLE 8. *Beer Meaſure.*

Cub. Inches,
35¼ = 1 *Pint,*
282 = 8 = 1 *Gallon,*
2538 = 72 = 9 = 1 *Firkin,*
5076 = 144 = 18 = 2 = 1 *Kild.*
10152 = 288 = 36 = 4 = 2 = 1 *Barrel.*
15228 = 432 = 54 = 6 = 3 = 1½ = 1 *Hhd.*
30456 = 864 = 108 = 12 = 6 = 3 = 2 = 1 *But.*

N. B. This Diſtinction or Difference betwixt *Ale* and *Beer* Meaſure is only uſed in *London.* But in all other Places of *England* the following Table of *Beer* or *Ale*, whether it be ſtrong or ſmall, is to be obſerved, according to a *Statue* of *Exciſe* made in the Year 1689.

TABLE 9. *Beer and Ale* in the Country.

Cub. Inches,
35¼ = 1 *Pint,*
282 = 8 = 1 *Gall.*
2397 = 68 = 8½ = 1 *Firkin,*
4794 = 136 = 17 = 2 = 1 *Kild.*
9588 = 272 = 34 = 4 = 2 = 1 *Barrel,*
14382 = 408 = 51 = 6 = 3 = 1½ = 1 *Hhd.*

All Beer and Ale, both in Town and Country, are meaſured by *Wincheſter* Meaſure.

TABLE 10. *Dry Meaſure.*

Cub. Inches,
33.6= 1 *Pint,*
268.8= 8= 1 *Gall.*
537.6= 16= 2= 1 *Peck,*
2150.4= 64= 8= 4= 1 *Buſhel,*
8601.6= 256= 32= 16= 4= 1 *Comb,*
17203.2= 512= 64= 32= 8= 2= 1 *Quarter,*
86016. =2560=320=160=40=10= 5=1 *Wey,*
172032.=5120=640=320=80=20=10=2=1 *Laſt.*

By this Meaſure, *Corn, Salt, Coals, Lead-Ore, Oiſters, Muſſels,* and other dry Goods are meaſured.

TABLE 11. *Cloth Meaſure.*

Inches,
2¼ = 1 *Nail,*
9 = 4 = 1 *Quarter,*
36 = 16 = 4 = 1 *Yard,*
45 = 20 = 5 = 1 *Ell-Eng.*
27 = 12 = 3 = 1 *Ell Flemiſh,*
54 = 24 = 6 = 1 *Ell French.*

Note, All *Scotch* and *Iriſh* Linens are bought and ſold by the *Yard,* but all *Dutch* Linens are bought by the *Ell Flemiſh,* and ſold by the *Ell Engliſh.*

TABLE 12. *Long Meaſure.*

Inches,
12 = 1 *Foot,*
36 = 3 = 1 *Yard,*
72 = 6 = 2 = 1 *Fathom,*
198 = 16½ = 5½ = 2¾ = 1 *Pole,*
7920 = 660 = 220 = 110 = 40 = 1 *Furlong,*
63360 = 5280 = 1760 = 880 = 320 = 8 = 1 *Mile.*

TABLE 13. *Sqnare Meaſure.*

Sq. Inches,
144 = 1 *Sq. Foot,*
1296 = 9 = 1 *Sq. Yard,*
39204 = 272¼ = 30¼ = 1 *Sq. Pole,*
1568160 = 10890 = 1210 = 40 = 1 *Sq. Rood,*
6272640 = 43560 = 4840 = 160 = 4 = 1 *Sq. Acre.*

This Meaſure is uſed in Menſuration of Superficies.

TABLE 14. *Time.*

Seconds,
60 = 1 *Minute,*
3600 = 60 = 1 *Hour,*
86400 = 1440 = 24 = 1 *Day. H. M. S.*
31556937 = 525949 = 8765 = 365 : 5 : 48 : 57 = 1 *Y.*

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DECIMAL TABLES,

For reducing the given Species of Money, Weight, *&c. to a* Decimal, *and alſo for finding the* Value *of a* Decimal *in the known Parts thereof.*

TABLE 1.

Sh.	D. Parts.
1	.05
2	.1
3	.15
4	.2
5	.25
6	.3
7	.35
8	.4
9	.45
10	.5
11	.55
12	.6
13	.65
14	.7
15	.75
16	.8
17	.85
18	.9
19	.95

TABLE 2. { *Of* Money. *One* Pound *the Integer.*

d.	Dec. Parts.	d.	Dec. Parts.
¼	.0010416	6¼	.0260416
½	.002083	6½	.027083
¾	.003125	6¾	.028125
1	.004166	7	.029166
1¼	.0052083	7¼	.0302083
1½	.00625	7½	.03125
1¾	.0072916	7¾	.0322916
2	.008333	8	.033333
2¼	.009375	8¼	.034375
2½	.010416	8½	.035416
2¾	.0114583	8¾	.0364583
3	.0125	9	.0375
3¼	.0135416	9¼	.0385416
3½	.014583	9½	.039583
3¾	.015625	9¾	.040625
4	.016666	10	.041666
4¼	.0177083	10¼	.0427083
4½	.01875	10½	.04375
4¾	.0197916	10¾	.0447916
5	.020833	11	.045833
5¼	.021875	11¼	.046875
5½	.022916	11½	.047916
5¾	.0239583	11¾	.0489583
6	.025		

Table 1. Shews alſo the Decimal of any Number of *Nails*, *one Ell Engliſh* being the *Integer*; thus the Decimal of 3 *Nails* is .15 of an *Ell*, and the Decimal of 3 *Quar.* and 3 *Nails*=15 *Nails* is .75 of an *Ell*.

Note, The Figures in theſe *Tables* daſhed thus 6̸ (as the laſt Figures of the 1ſt and 2d Numbers in *Table* 2.) are *Repetends*. What Repetends are, the Manner of working them, their Uſe, &c. is ſhewn in the 10th *Chap*.

TABLE 1.

C.	*D. Parts.*
1	.05
2	.1
3	.15
4	.2
5	.25
6	.3
7	.35
8	.4
9	.45
10	.5
11	.55
12	.6
13	.65
14	.7
15	.75
16	.8
17	.85
18	.9
19	.95

TABLE 2. Avoirdupois Weight, 1 *Tun the Int*

lb.	*Dec.Parts.*	*q. lb.*	*Dec.Parts.*	*q. lb.*	*Dec.Parts.*
1	.000446	1 : 10	.016964	2 : 19	.033482
2	.000893	1 : 11	.017411	2 : 20	.033929
3	.001339	1 : 12	017857	2 : 21	.034375
4	.001786	1 : 13	.018304	2 : 22	.034821
5	.002232	1 : 14	.01875	2 : 23	.035268
6	.002679	1 : 15	.019196	2 : 24	.035714
7	.003125	1 : 16	.019643	2 : 25	.036161
8	.003571	1 : 17	.020089	2 : 26	.036607
9	.004018	1 : 18	.020536	2 : 27	.037054
10	.004464	1 : 19	.020982	3 :	.0375
11	.004911	1 : 20	.021429	3 : 1	037946
12	.005357	1 : 21	.021875	3 : 2	.038393
13	.005804	1 : 22	.022321	3 : 3	.038839
14	.00625	1 : 23	.022768	3 : 4	.039286
15	.006696	1 : 24	.023214	3 : 5	.039732
16	,007143	1 : 25	023661	3 : 6	.040179
17	.007589	1 : 26	.024107	3 : 7	.040625
18	.008036	1 : 27	024554	3 : 8	.041071
19	008482	2 :	.025	3 : 9	.041518
20	.008929	2 : 1	.025446	3 : 10	,041964
21	.009375	2 : 2	.025893	3 : 11	.042411
22	.009821	2 : 3	.026339	3 : 12	.042857
23	.010268	2 : 4	.026786	3 : 13	.043304
24	.010714	2 : 5	.027232	3 : 14	.04375
25	.011161	2 : 6	.027679	3 : 15	.044196
26	.011607	2 : 7	.028125	3 : 16	.044643
q. 27	.012054	2 : 8	.028571	3 : 17	.045089
1 :	.0125	2 : 9	.029018	3 : 18	.045536
1 : 1	.012946	2 : 10	.029464	3 : 19	.045982
1 : 2	013393	2 : 11	.029911	3 : 20	046429
1 : 3	.013839	2 : 12	.030357	3 : 21	.046875
1 : 4	.014286	2 : 13	.030804	3 : 22	.047321
1 : 5	.014732	2 : 14	.03125	3 : 23	.047768
1 : 6	.015179	2 : 15	031696	3 : 24	.048214
1 : 7	.015625	2 : 16	032143	3 : 25	.048661
1 : 8	.016071	2 : 17	.032589	3 : 26	.049107
1 : 9	.016518	2 : 18	.033036	3 : 27	.049554

TABLE 1.

q.	D.P.
1	.25
2	.5
3	.75

TABLE 2. Avoirdupois Weight, 1 C. *the Integ.*

lb.	Dec.Parts.	lb.	Dec.Parts.	lb.	Dec.Parts.
1	.008929	10	.089286	19	.169643
2	.017857	11	.098214	20	.178571
3	.026786	12	.107143	21	.1875
4	.035714	13	.116071	22	.196429
5	.044643	14	.125	23	.205357
6	.053571	15	.133929	24	.214286
7	.0625	16	142857	25	.223214
8	.071429	17	.151786	26	.232143
9	.080357	18	.160714	27	.241071

Avoirdupois Weight, *one lb. the Int.*

TABLE 1.

Oz.	D.P.
1	.0625
2	.125
3	.1875
4	.25
5	.3125
6	.375
7	.4375
8	.5
9	.5625
10	.625
11	.6875
12	.75
13	.8125
14	.875
15	.9375

TABLE 2.

Dr	D. Parts.
1	.003906
2	.007812
3	.011719
4	.015625
5	.019531
6	.023437
7	.027344
8	.03125
9	.035156
10	.039062
11	.042969
12	.046875
13	.050781
14	.054687
15	.058594

By the firſt *Table* on the left Hand, which ſhews the Decimal of *Ounces*, one *Pound* being the *Integer*; is ſeen alſo the Decimal of any Number of *Drams*, one *Ounce* being the *Integer*; for as one Ounce is .0625 of a Pound, when a *Pound* is the *Integer*, ſo 1 Dram is .0625 of an Ounce, an *Ounce* being the *Integer*, &c.

The 1ſt *Table* ſhews likewiſe the Decimal of any Number of *Nails*, one *Yard* being the *Integer*; thus the Decimal of 3 *Quar.* and 2 *Nails*=14 *Nails*, is .875 of a *Yard*.

And by it is ſeen alſo the Decimal of any *Vulgar Fraction* whoſe *Denominator* is either 16, 8, or 4, which Fractions frequently occur in Buſineſs; thus the Decimal of $\frac{1}{16}$ is .0625; the Decimal of $\frac{1}{8}$ or $\frac{2}{16}$ is .125; the Decimal of $\frac{1}{4}=\frac{4}{16}$ is .25; alſo the Decimal of $\frac{3}{8}=\frac{6}{16}$ is .375, &c.

TABLE 1.

Oz.	D.P.
3	.25
6	.5
9	.75

TABLE 3.

G.	D. P.
1	.000174
2	.000347
3	.000521
4	.000694
5	.000868
6	.001042
7	.001215
8	.001388
9	.001562
10	.001736
11	.00191
12	.002083
13	.002257
14	.002431
15	.002604
16	.002777
17	.002951
18	.003125
19	.003298
20	.003472
21	.003646
22	.003819
23	.003993

TABLE 2. Troy Weight, *One Pound the Integer.*

P.w.	D. P.	Oz. P.	D. P.	Oz. P.	D. P
1	.004166	1 :	.083333	2 :	.166666
2	.008333	1 : 1	.0875	2 : 1	.170833
3	.0125	1 : 2	.091666	2 : 2	.175
4	.016666	1 : 3	.095833	2 : 3	.179166
5	.020833	1 : 4	.1	2 : 4	.183333
6	.025	1 : 5	.104166	2 : 5	.1875
7	.029166	1 : 6	.108333	2 : 6	.191666
8	.033333	1 : 7	.1125	2 : 7	.195833
9	.0375	1 : 8	.116666	2 : 8	.2
10	.041666	1 : 9	.120833	2 : 9	.204166
11	.045833	1 : 10	.125	2 : 10	.208333
12	.05	1 : 11	.129166	2 : 11	.2125
14	.054166	1 : 12	.133333	2 : 12	.216666
13	.058333	1 : 13	.1375	2 : 13	.220833
15	.0625	1 : 14	.141666	2 : 14	.225
16	.066666	1 : 15	.145833	2 : 15	.229166
17	.070833	1 : 16	.15	2 : 16	.233333
18	.075	1 : 17	.154166	2 : 17	.2375
19	.079166	1 : 18	.158333	2 : 18	.241666
		1 : 19	.1625	2 : 19	.245833

Troy Weight, 1 *Ounce the Integer.*

TABLE 1.

P.w.	D.P.	P.w.	D.P.
1	.05	11	.55
2	.1	12	.6
3	.15	13	.65
4	.2	14	.7
5	.25	15	.75
6	.3	16	.8
7	.35	17	.85
8	.4	18	.9
9	.45	19	.95
10	.5		

TABLE 2.

G.	D. P.	G.	D. P.
1	.002083	13	.027083
2	.004166	14	.029166
3	.00625	15	.03125
4	.008333	16	.033333
5	.010416	17	.035416
6	.0125	18	.0375
7	.014583	19	.039583
8	.016666	20	.041666
9	.01875	21	.04375
10	.020833	22	.045833
11	.022916	23	.047916
12	.025		

Note, All the Numbers in the above Tables, (except .55 againſt 11 P.w.) having two or more of the Right-hand Figures the ſame, are *Repetends*; but they are not marked or daſhed, the Figures being too ſmall.

TABLE 1.

Hhd.	*D. P.*
1	.25
2	.5
3	.75

TABLE 2 Wine Meaſure, 1 *Ton the Integer.*

G.	*D. Parts.*	G.	*D. Parts.*	G.	*D. Parts.*
1	.003968	22	.087302	43	.170635
2	.007937	23	.09127	44	.174603
3	.011905	24	.095238	45	.178571
4	.015873	25	.099206	46	.18254
5	.019841	26	.103175	47	.180508
6	.02381	27	.107143	48	.190476
7	.027777	28	.111111	49	.194444
8	.031746	29	.115079	50	.198413
9	.035714	30	.119048	51	.202381
10	.039682	31	.123016	52	.206349
11	.043651	32	.126984	53	.210317
12	.047619	33	.130952	54	.214286
13	.051587	34	.134921	55	.218254
14	.055555	35	.138888	56	.222222
15	.059524	36	.142857	57	.22619
16	.063492	37	.146825	58	.230159
17	.06746	38	.150794	59	.234127
18	.071429	39	.154762	60	.238095
19	.075397	40	.15873	61	.242063
20	.079365	41	.162698	62	.246032
21	.083333	42	.166666		

TABLE 1.

M.	*D. Parts.*
1	.083333
2	.166666
3	.25
4	333333
5	.416666
6	.5
7	.583333
8	.666666
9	.75
10	.833333
11	.916666

Da.	*D. Parts.*
100	.273973
200	.547945
300	.821918

The 1ſt *Table* above ſhews alſo the Decimal of any Number of *Inches*, one *Foot* being the *Integer*.

TABLE 2. Time, *one Year the Integer.*

D.	*D. Parts.*	*D.*	*D. Parts.*	*D.*	*D. Parts.*
1	.00274	34	.093151	67	.183562
2	.005479	35	.09589	68	.186301
3	008219	36	.09863	69	.189041
4	.010959	37	.10137	70	.191781
5	.013699	38	.10411	71	.194521
6	.016438	39	.106849	72	.19726
7	.019178	40	.109589	73	.2
8	.021918	41	.112329	74	.20274
9	.024658	42	.115068	75	.205479
10	.027397	43	.117808	76	.208219
11	.030137	44	.120548	77	.210959
12	.032877	45	.123288	78	.213699
13	.035616	46	.126027	79	.216438
14	.038356	47	.128767	80	.219178
15	.041096	48	.131507	81	.221918
16	.043836	49	.134247	82	.224658
17	.046575	50	.136986	83	.227397
18	.049315	51	.139726	84	.230137
19	.052055	52	.142466	85	.232877
20	.054795	53	.145205	86	.235616
21	.057534	54	.147945	87	.238356
22	.060274	55	.150685	88	.241096
23	063014	56	.153425	89	.243836
24	.065753	57	.156164	90	.246575
25	.068493	58	.158904	91	.249315
26	.071233	59	.161644	92	.252055
27	.073973	60	.164384	93	.254795
28	.076712	61	.167123	94	.257534
29	.079452	62	.169863	95	.260274
30	.082192	63	.172603	96	.263014
31	.084932	64	.175342	97	.265753
32	.087671	65	.178082	98	.268493
33	.090411	66	.180822	99	.271233

Theſe *Tables* with *thoſe* hereafter inſerted in the Computation of *Exchanges*, are ſufficient to anſwer moſt Purpoſes in regard to bringing *into* or *out* of Decimals; but as other Tables may be ſometimes requiſite, I ſhall next ſhew the Method of making any of theſe Kind of Decimal Tables, that any one may be able to furniſh himſelf with Tables ſuitable to his reſpective Buſineſs or Employment, &c.

RULE.

Divide an *Unit* by the Number of Parts of the loweſt Denomination contained in the *Integer*, and the *Quotient* will be the Decimal for 1 ſuch Part, which Quotient being *continually added* will conſtitute the Table.

For Inſtance, ſuppoſe a *Week* the Integer, and it were required to make a Table ſhewing the Decimal (I'll ſuppoſe to 4 *Places* only) of 1, 2, 3, and ſo on to 7 *Days*. Here the Number of Parts of the loweſt Denomination contained in the Integer is 7; ſo I firſt divide 1 by 7, and the *Quotient* is .1428, the Decimal for 1 Day (to 4 *Places*) but there being a *Remainder* of 4, I ſet it down next the Quotient, (as in the following Left-hand Table) thus, $.1428\frac{4}{7}$; and the Quotient, with the Remainder placed in this Manner, I ſhall call a *mixt Fraction*; then for the Decimal for 2 Days, I add $.1428\frac{4}{7}$ to itſelf, or, which is the ſame Thing, double it, and beginning with the Numerator of the *Vulgar Fractional Part* (for ſo the $\frac{4}{7}$ may be called) I ſay twice 4 is 8, which being 1 more than the Denominator 7, I ſet down $\frac{1}{7}$, and carrying 1, I ſay twice 8 is 16, and 1 is 17; then I ſet down 7, and carry 1; and thus multiplying the whole by 2 gives $.2857\frac{1}{7}$, the *mixt Fraction* for 2 Days; I next add this mixt Fraction for 2 days to the mixt Fraction for 1 Day, ſaying 1 and 4 is 5, then I ſet down $\frac{5}{7}$, and the reſt being added the ſum is $.4285\frac{5}{7}$, the *mixt Fraction* for 3 Days; which I likewiſe add to the mixt Fraction for 1 Day, ſaying 5 and 4 is 9, which being 2 more than the Denominator 7, I ſet down $\frac{2}{7}$, and carrying 1, I ſay 1 and 5 is 6, and 8 is 14; then I ſet down 4, and proceeding with the other Figures as in common Addition, the Sum is $.5714\frac{2}{7}$;

and thus by continually adding the *mixt Fraction* for 1 Day, the *mixt Fraction* is found for every Day required.

Laſtly, if the Numerator of the *Vulgar Fractional Part* be more than half the Denominator, I add 1 to the laſt Decimal Place, but if the Numerator be leſs, no Notice is taken of it, which being obſerved, the Decimal Table will ſtand compleat to 4 Places of Decimals as on the Right-hand. And in like Manner may any Decimal Table be made to any Number of Decimal Places.

One Week the *Integer.*

Days.	*Mixt Fract.*
1	$.1428\frac{4}{7}$
2	$.2857\frac{1}{7}$
3	$.4285\frac{5}{7}$
4	$.5714\frac{2}{7}$
5	$.7142\frac{6}{7}$
6	$.8571\frac{3}{7}$
7	1.0000

One Week the *Integer.*

Days.	*D. Parts.*
1	.1429
2	.2857
3	.4286
4	.5714
5	.7143
6	.8571

CHAP. II.

The Uſe of DECIMALS *in the* Rules *of* Proportion, *viz. the* Rule *of* THREE Direct *and* Inverſe; *and the* Double Rule *of* THREE, *or* Rule *of* Five Numbers.

SECT. I. *Of the* Rule *of* THREE Direct.

D*Irect Proportion* is, when of four Numbers, the firſt bears the ſame Proportion to the ſecond, as the third doth to the fourth :

As in theſe 2 : 8 : : 6 : 24.

Conſequently the greater the ſecond Term is, in reſpect to the firſt, the greater will the fourth Term be in reſpect to the third.

That is, as 8 the ſecond Term is 4 Times greater than 2 the firſt Term; ſo is 24 the fourth Term, 4 Times greater than 6 the third Term.

Again, the leſs the ſecond Term is, in reſpect to the firſt; the leſs will the fourth Term be, in reſpect to the third :

As in theſe, 18 : 6 : : 12 : 4

That is, as 6 the ſecond Term is equal to $18 \div 3$; ſo is 4 the fourth Term equal to $12 \div 3$.

Whence it follows, that if four Numbers are in direct Proportion, the Product of the firſt and fourth Numbers will always be equal to the Product of the ſecond and third;

For $2 \times 24 = 8 \times 6 = 48$.
And $18 \times 4 = 6 \times 12 = 72$.

Hence are deduced the 3 general Rules hereafter mentioned for finding a fourth Number in Proportion to any three given Numbers; *whence it is called the Rule of Three.*

Before any Operation is performed in this Rule the given Numbers muſt be ranged in their proper Order, which is called *ſtating the Queſtion*; in order to which obſerve, that two of the three given Numbers imply a Suppoſition, the third moves the Queſtion, and the fourth gives the Anſwer. This being premiſed, any Queſtion may be eaſily ſtated by theſe Directions, *viz.*

1*ſt*, Let that Number which moves the Queſtion, or to which the Demand is affixed, be the third Term; which Number may be known by its having generally ſome of theſe Words before it, *viz. What will*; *how many*; *How much*; *how far*, &c.

2*d*, The firſt Term muſt be always of the ſame Kind and Denomination with the third; and the Number ſought will be always of the ſame Kind and Denomination with the ſecond Term in the Suppoſition.

When ſtated agreeable to theſe Directions, all Queſtions in *Direct Proportion* may be anſwered by three ſeveral Rules.

Rule 1. Multiply the ſecond and third Terms together, and divide their Product by the firſt, the Quotient will be the Anſwer required.

Rule 2. Divide the ſecond Term by the firſt, then multiply the Quotient into the third Term, and their Product will be the Anſwer required.

Rule 3. Divide the third Term by the firſt; then multiply the Quotient into the ſecond Term, and their Product will be the Anſwer.

In order to work Queſtions in this Rule *intirely* by Decimals, thoſe of the given Numbers which conſiſt of diverſe Denominations, muſt be expreſſed decimally, by which Means the Anſwer will be obtained in the ſhorteſt and beſt Manner, provided the *firſt* Term be either a *whole Number*, or contains but *one or two Decimal Places*; but if it contains many Places of Decimals, it muſt neceſſarily cauſe perhaps a longer Operation in Diviſion, than if worked by whole Numbers; in ſuch Caſe therefore it is generally better to order with the firſt and third Terms, as I have ſhown in ſeveral of the Examples in Exchanges. The

following

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following Examples however are wrought altogether decimally, and may ſuffice to ſhew that Decimals are frequently of great Advantage in anſwering Queſtions in the *Rule of Three Direct.*

As to the Manner of reducing the Parts of *Coin*, *Weight*, &c. that has been already fully ſhewn, ſo in moſt of the following Work, I ſhall only ſet down the Decimal equal to the given Parts.

QUESTION I.

l. *s.*
If a Rowl of *German Oſnaburghs* of 1500 *Ells* coſt 47 : 10 = *l.* 47.5. what will 4872 *Ells* coſt?

Ells. *l.* *Ells.*
Thus ſtated, if 1500——47.5——4872
47.5
———
24360
34104
19488
———
$500\times3=1500\left\{\begin{array}{l} 5|00\ )\,231420.0 \\ 3\ )\,462.840 \end{array}\right.$
——— *l.* *s.* *d.*
l. 154.28 = 154 : 5 : 7¼,
——— the Anſw.

Or thus,

Hund. Ells. *l.* *Hund. Ells.*
If 15——47.5——48.72
2 2 95
—— —— ——
30 95.0 24360
43848
———
3|0)4628.40
———

The Anſwer, *l.* 154.28 as before.

Note, The Reaſon of multiplying the 1ſt and 2d Numbers by 2, is only to ſhorten the Work. This Kind of Queſtion frequently occurs in the Linen-drapery Buſineſs.

QUESTION II.

What will 153 Days Salary amount to at 70 Guineas *per Annum*.

l. *s.* *l.* *Days*,
Firſt 70 Guineas=73 : 10=73.5, and 153=.419178 of
Year, *l.* *Year.* a Year.
Then, if 1———73.5———.419178
Multiply by 5 37 the middle Term inverted.

29.3425
1.2575
.2096

l. *s.* *d.*
The Anſwer, £. 30.8096=30 : 16 : 2¼.

Note, if the Anſwer to a Queſtion is found to *four Places of Decimals* it is generally ſufficient.

QUESTION

QUESTION III.

How much Bank Stock will $\overset{l.}{475} : \overset{s.}{13} : \overset{d.}{5}$ purchaſe at $118\frac{3}{8}$ *per Cent.?*

Firſt, $\overset{l.}{118\frac{3}{8}} = \overset{l.}{118.375}$, and $\overset{l.}{475} : \overset{s.}{13} : \overset{d.}{5} = \overset{l.}{475.6708}$,

Then if $\overset{l.}{118.375}$—$\overset{l.\ Stock.}{100}$——$\overset{l.}{475.6708}$

```
                475.6708
                --------      l.
118.375)47567.08(401.834=l. 401 : 16 : 8, the
 .. ...  473500                          Anſwer.
         ------
          2170
          1184
          ----
           986
           947
           ---
            39
            35
            --
             4
             4
             -
             •
```

Queſtions of this Kind may alſo be worked in the following Manner.

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l. *l. Stock.* *l.*

If $118\frac{3}{8}$ —— 100 —— 475.6708
8 8 Mult.

947 Prod. × 100 = 38053.664

l.

947)38053.664(401.834 as before.
3788

1736
947

7896
7576

3204
2841

3630
3788

The ſame proved.

l. *s.* *d.* *l.*
401 : 16 : 8 = 401.834 Stock at $118\frac{3}{8}$ *per Cent.*
Multiply $118\frac{3}{8}$

3214.672
44201.74
$\frac{3}{8}$ - $\frac{1}{4}$ 100.458 = 401.834 ÷ 4
$\frac{1}{8}$ - $\frac{1}{2}$ of that, 50.229

l. *s.* *d.*
Prod. ÷ 100 = 475.67099 = 475 : 13 : 5, the Amount of the Stock.

And after this Manner may the Amount be computed of any Sum in the *Public Funds* in general.

QUEST-

QUESTION IV.

If Goods are bought to the Amount of *l.* 727 : 12 : 6, and ſold again for *l.* 790 : 7 : 6, how much is gained *per Cent.*?

	l.	*s.*	*d.*	*l.*	
From	790 :	7 :	6=	790.375	
Subtract	727 :	12 :	6=	727.625	
Rem.	62 :	15 :	0=	62.750	whole Gain.

Then, if *l.* 727.625——*l.* 62.75——*l.* 100

100

727.6|25)6275.0|0(Anſw. 8.624=8 : 12 : 5¾, *l. l. s. d.* the Gain *per Cent.*

5821 0

4540
4366

174
145

29
29

Q U E-

QUESTION V.

If a Peck Loaf ſhould weigh 21 : 1 : 19 : 14 (℔. *oz. P.w. gr.*) *Troy Weight*, what muſt the Weight be *Avoirdupois?*

```
        ℔.   oz.  P.w.  gr.  ℔.
Firſt   21 :  1 :  19 : 14=21.123263, and
```

It was obſerved Page 46, that a *Pound Avoirdupois* is equal to 1.215191 *Pound Troy*. Hence it will be

```
   ℔. Troy.        ℔. Avoir.    ℔. Troy.
If 1.215191————————1————————21.123263
                              ℔.
1.21519|1)21.1232|63(      17.3827
.....     121519    Sub.   .375=6 oz.     } per
          ——————           ————           } Tables.
           89713    Rem.   .0077=2dr.     }
           85063
          ———————
            4650
            3646
          ———————
            1004
             972
            ————
              32
              24
              ——
               8
               8
               —
```

Hence the Anſwer is 17 ℔. 6 *oz.* 2 *dr. Avoirdupois.*

S E C T. II. *Of* Reciprocal Proportion, *or the* Rule *of* THREE Inverſe.

Reciprocal Proportion is, when of four Numbers, the third (*viz.* that which moves the Queſtion) bears the ſame Proportion to the firſt, as the ſecond does to the fourth.

Therefore, the leſs the third Term is, in reſpect to the firſt, the greater will the fourth Term be, in reſpect to the ſecond.

And, the greater the third Term is, in reſpect to the firſt, the leſs will the fourth Term be, in reſpect to the ſecond.

The ſame Directions for ſtating the Queſtion are to be obſerved here as in Direct Proportion, and to know whether a Queſtion is in *Direct* or *Reciprocal Proportion*, obſerve this Rule, *viz.*

When the third Term is greater than the firſt, and requires the fourth Term to be greater than the ſecond; or, when the third Term is leſs than the firſt, and requires the fourth Term to be leſs than the ſecond, then is the Queſtion in *Direct Proportion:* But when the third Term is greater than the firſt, and requires the fourth Term to be leſs than the ſecond; or, when the third Term is leſs than the firſt, and requires the fourth Term to be greater than the ſecond, then is the Queſtion in *Reciprocal* or *Inverſe Proportion:* And is performed by this general *Rule,*

Multiply the firſt and ſecond Terms together, and divide the Product by the third Term, the Quotient will be the fourth Term, or Anſwer.

EXAMPLE I.

If 8 Men do a Piece of Work in 12 Days; how many Days will 16 Men require to do the ſame?

Men. Days. Men.
If 8——12——16
8
——
16)96(6 Days, the Anſwer.
96
——

Here it is plain, that the fourth Term muſt be leſs than the ſecond, becauſe 16 Men undoubtedly can do the ſame Work in leſs Time than 8 can; and as the third Term is greater than the firſt, and requires the fourth Term to be leſs than the ſecond, hence the Queſtion is in Reciprocal Proportion.

And the Reaſon of the Operation (and conſequently of the Rule) is grounded upon this Conſideration; *viz.* if 8 Men require 12 Days to do the Work, it is plain that one man would require 8 Times 12 Days=96 Days to do the ſame Work; but if one Man can do it in 96 Days, moſt certain 16 Men can do it in one 16th Part of that Time, *i.e.* 6 Days, as before.

EXAMPLE II.

If 16 Men can do a Piece of Work in 6 Days, how many Days will 8 Men require to do the ſame.

Men. Days. Men.
If 16——6——8
16
——
8)96
——
12 Days, the Anſwer.

Here it is evident, that the fourth Term muſt be greater than the ſecond; becauſe 8 Men muſt needs have more Time than 16 Men, to do the ſame Work; and as the third Term is leſs than the firſt, and requires the fourth Term to be greater than the ſecond, it ſhews the Queſtion is in Reciprocal Proportion.

For the greater Perſpicuity in this Rule, I have made choice of whole Numbers in the 2 foregoing Examples.

QUESTION III.

A borrowed of his Friend *B* thirty Guineas for 6 Months, promiſing to do him the like Kindneſs at another Time. Not long after *B* deſires *A* to lend him 40 *l*, the Queſtion is, how long *B* muſt keep the 40 *l.* to equal his former Kindeſs to *A*?

Firſt, 30 Guineas = *l.* 31.5
l. *M.* *l.*
Then, if 31.5——6——40
31.5

4|0)189.0

4.725 Months,
Mult. 30

21.750 Days

Anſwer, 4 Months and 21.75 Days.

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QUESTION IV.

If a Penny White Loaf ought to weigh 6 *oz.* 12 *dr.* *Avoirdupois*, when Wheat is ſold at 6 *s.* 6 *d.* *per Buſhel*, what muſt it weigh when Wheat is ſold at 4 *s.* *per Buſh.* ?

Firſt, 6 *s.* 6 *d.*=6.5 *Shill.* and 6 *oz.* 12 *dr.*=6.75 *Ounces*.

```
              s.      oz.       s.
Then, if    6.5——————6.75——————4
                      6.5
                    ————
                     3375
                    4050
                   —————
                 4)43.875
                   ——————--  oz.  dr.
                   10.968 = 10 : 15
                   ——————
```

SECT. III. *Of the* Double Rule *of* THREE, *or* Rule *of* Five Numbers.

In this Rule of Proportion there are five Numbers given to find a ſixth in Proportion, and it is generally performed by a double Poſition: that is, by ſtating and working the Queſtion at two Operations, either in Direct or Reciprocal Proportion, according as the Queſtion requires,

And therefore it is called the Double Rule of Three.

The *Double Rule Direct* is, when the ſixth Term or Number ſought, is found by two Operations, *both* of them in *Direct Proportion.*

EXAM.

EXAMPLE I.

If 100 *l.* gain 3 *l.* 10 *s.* in 12 Months, how much will 300 *l.* gain in 9 Months at the ſame Rate ?

The Queſtion being parted into two Poſitions, the firſt will be thus;

If *l.* 100 gain *l.* 3.5 in 12 Months, how much will *l.* 300 gain in the ſame Time.

l. *l.* *l.*
If 100——3.5——300
300
100)1050.0
£. 10.5 the Intereſt of 300 *l.* for 12 Months.

Then the next ſtating will be; if *l.* 300 in 12 Months gain *l.* 10.5, how much will it gain in 9 Months ?

l. *l.* *M.*
If 12——10.5——9
9
12)94.5
l. *s.* *d.*
7.875=7 : 17 : 6 the Anſwer required.

The *Double Rule of Three inverſe* is, when the ſixth Term or Number ſought is found at two Operations (as before). But one of them requires an Anſwer in *Reciprocal Proportion.*

EXAM-

EXAMPLE II.

If 8 Reapers have 4 *l.* 16 *s.* for 6 Days Work; how many Reapers will earn 19 *l.* 4 *s.* in 16 Days.

The firſt ſtating in this Queſtion will be thus;

If *l.* 4.8 is earned by 8 Reapers in 6 Days, how many Reapers will earn *l.* 19.2 in the ſame Time.

Here it is plain, that there muſt be a greater Number of Reapers to earn *l.* 19.2 in 6 Days, than there are to earn *l.* 4.8 in the ſame Time, therefore this ſtating falls in *Direct Proportion.*

```
    l.     Reap.   l.
If 4.8———8———19.2
          19.2
         ————
  48)153.6(32
         144
         ———
          96
          96
          ——
          ..
```

Reapers, that is, if *l.* 4.8 is earned by 8 Reapers in 6 Days; *l.* 19.2 will be earned by 32 Reapers in the ſame Time.

The next ſtating will be to find how many Reapers will earn *l.* 19.2 in 16 Days, at the ſame Rate: It is plain, that it will require a leſs Number of Men to earn *l.* 19.2 in 16 Days than in 6 Days, ſo that this ſecond ſtating muſt be done by *Reciprocal Proportion.*

Days. *Reap.* *Days.*

If 6——32——16

6

——

16)192(12 Reapers, the Anſw. required.

16

——

32

32

——

..

In like Manner any Queſtion in the *Double Rule of Three* may be anſwered by two ſingle Poſitions, if Care be taken in ſtating them right, and whether their Operation muſt be performed by the ſingle Rule *Direct* or *Inverſe.*

But all Queſtions both *Direct* and *Inverſe*, where five Numbers are propoſed to find a ſixth, may more eaſily and readily be anſwered by two general Rules, the Numbers being firſt truly placed; to do which you muſt carefully note, that three of the given Numbers are always conditional and ſuppoſed, and that the other two move the Queſtion.

The three conditional Terms muſt always be placed in this Order.

Let that Number which is the principal Cauſe of *Gain* or *Loſs*, *Intereſt* or *Decreaſe*, *Action* or *Paſſion*, be put in the *firſt Place*; that Number which denotes the *Space of Time*, or *Diſtance of Place*, &c. be put in the *ſecond Place*; and that Number which is the *Gain*, *Loſs*, or *Action*, be put in the *third Place.*

This done, place the other two Terms which move the Queſtion, underneath thoſe of the ſame Name.

Then if the *Blank*, or Term ſought, fall under the third Place, the Queſtion is *Direct*, and muſt be performed by this Rule.

Rule 1. Multiply the three laſt Terms together for a Dividend, and the two firſt together for a Diviſor; the Quotient ariſing from them will be the ſixth Term.

But if the *Blank* or Term ſought fall under the firſt or ſecond Place, the Queſtion is *Inverſe*, and muſt be thus performed.

Rule 2. Multiply the firſt, ſecond, and laſt Terms together for a Dividend, and the other two together for a Diviſor; the Quotient ariſing from them will be the ſixth Term.

To apply theſe Directions and Rules to the *two laſt Examples.*

1. If l. 100 gain l. 3.5 in 12 Months; *theſe three Terms are only ſuppoſed or conditional. Then comes the Queſtion*; what will *l.* 300 gain in 9 Months.

Agreeable to the above Directions the Numbers muſt be placed thus.

l.	*Months.*	*l.*
100	12	3.5
300	9	

The *Blank* falling under the third Place, the Operation muſt be performed by *Rule* 1.

Thus 3.5 × 300 × 9 = 9450 the Dividend
And 100 × 12 = 1200 the Diviſor.

Then 1200) 9450 (= *l.* 7.875 the Anſwer as before.

2. If 8 Reapers have *l.* 4.8 for 6 days work; how many Reapers will earn *l.* 19.2 in 16 Days?

The Terms being placed by the above Directions, they will ſtand thus.

Reapers.	*Days*	*l.*
8	6	4.8
	16	19.2

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The *Blank* falling under the firſt Term it muſt be performed, by *Rule* 2.

Thus 8 × 6 × 19.2 = 921.6
And 4.8 × 16 = 76.8

Then 76.8)921.6(12 Reapers, the Anſwer as before.
768
———
1536
1536
———

QUESTION III.

If 12 Reapers earn 19*l.* 4*s.* in 16 Days, in how many Days will 8 Reapers earn 4*l.* 16*s.*

Theſe Numbers will ſtand thus,

Reapers.	*Days.*	*l.*
12	16	19.2
8		4.8

Here the *Blank* falls under the ſecond Place; therefore it muſt be done by *Rule* 2.

Thus 12 × 16 × 4.8 = 921.6
And 19.2 × 8 = 153.6

Then 153.6)921.6(6 Days the Anſwer.
9216
———
....

QUESTION IV.

If the Carriage of 5*C.* 3*qrs.* 150 Miles, coſt 3*l.* 7*s.* 4*d.* what muſt be paid for the Carriage of 7*C.* 2*qrs.* 25lb. 64 Miles, at the ſame Rate?

Here the numbers will ſtand thus,

C.	*Miles*	*l.*
5.75	150	3.366666
7.7232	64	

```
              3.366666
Multiply by   2327.7  the fourth Number invert.
              ───────
              23.5667
               2.3566
                  673
                  101
                    7
              ───────
              26.0014
        Mult. ─ 64
              ───────
              1040056
             1560084
             ────────      l.
5.75 × 150 = 862.5)1664.08|96 (1.9292 =
               8625
               ────     1l. 18s. 7d. the Anſwer
               80159
               77625
               ─────
                2534
                1725
                ────
                 809
                 776
                 ───
                  23
                  17
                  ──
                   6
```

CHAP.

CHAP. III.

Decimal Practice; *or a Short way of computing all kind of Merchandize by* DECIMALS.

The common Method of working Practice by taking *Aliquot Parts* for broken Quantities, makes it very difficult; but ſuch is the great Utility of Decimals in this Rule, that the trouble of taking *ſuch Parts* is avoided, and thereby the moſt difficult Rule in common Arithmetic (when done the uſual way) is rendered very eaſy, and inſtead of many Tables of Aliquot Parts, which the common Method requires; here, only the following one (of Money) will be ſufficient, which I would adviſe the Learner to be very Perfect in.

s.	*d.*	Parts
10		$\frac{1}{2}$
6	8	$\frac{1}{3}$
5		$\frac{1}{4}$
4		$\frac{1}{5}$
3	4	$\frac{1}{6}$
2	6	$\frac{1}{8}$
2		$\frac{1}{10}$
1	8	$\frac{1}{12}$
1		$\frac{1}{20}$
-	8	$\frac{1}{30}$
-	6	$\frac{1}{40}$
-	4	$\frac{1}{60}$
-	3	$\frac{1}{80}$
-	2	$\frac{1}{120}$

The *even* or *Aliquot Parts* of a Pound Sterling. *Dividing* by which gives the Anſwer in *Pounds*.

CASE I.

When the given Price of a *Pound*, *Yard*, *Piece*, &c. is *leſs than a Shilling*, the Anſwer is found by the Directions in the following *Table*, which ſhews the reſpective *Diviſors*, by which any *Quantity* is to be divided, &c.

The TABLE.

Price	*Diviſors.*	*Price*	*Diviſors.*	*Price*	*Diviſors.*
d.	*d.*	*d.*	*d.*	*d.*	*d.*
$\frac{1}{4}$	3 - $\frac{1}{80}$ of *l.* $\frac{1}{4}$ - $\frac{1}{12}$ of 3*d.*	2$\frac{1}{2}$	2 - $\frac{1}{120}$ of *l* +$\frac{1}{2}$ - $\frac{1}{4}$ of 2*d.*	4$\frac{3}{4}$	3 - $\frac{1}{80}$ of *l.* +1$\frac{1}{2}$ - $\frac{1}{2}$ of 3*d.* +$\frac{1}{4}$ - $\frac{1}{6}$ of 1*d*$\frac{1}{2}$
$\frac{1}{2}$	*d.* 3 - $\frac{1}{80}$ of *l.* $\frac{1}{2}$ - $\frac{1}{6}$ of 3*d.*	2$\frac{3}{4}$	*d.* 3 - $\frac{1}{80}$ of *l.* —$\frac{1}{4}$ - $\frac{1}{12}$ of 3*d.*	5	*s.* 5 - $\frac{1}{4}$ of *l.* *d.* 5 - $\frac{1}{12}$ of 5*s.*
$\frac{3}{4}$	*d.* 3 - $\frac{1}{80}$ of *l* $\frac{3}{4}$ - $\frac{1}{4}$ of 3*d.*	3	*d.* 3 - $\frac{1}{80}$ of *l.*	5$\frac{1}{4}$	*d.* 6 - $\frac{1}{40}$ of *l.* —$\frac{3}{4}$ - $\frac{1}{8}$ of 6*d.*
1	*d.* 3 - $\frac{1}{80}$ of *l.* 1 - $\frac{1}{3}$ of 3*d.*	3$\frac{1}{4}$	*d.* 3 - $\frac{1}{80}$ of *l.* +$\frac{1}{4}$ - $\frac{1}{12}$ of 3*d.*	5$\frac{1}{2}$	*d.* 6 - $\frac{1}{40}$ of *l.* —$\frac{1}{2}$ - $\frac{1}{12}$ of 6*d.*
1$\frac{1}{4}$	*s.* *d.* 2 : 6 - $\frac{1}{8}$ of *l.* 5 - $\frac{1}{6}$ of 2*s.*6*d.* 1$\frac{1}{4}$ - $\frac{1}{4}$ of 5*d.*	3$\frac{1}{2}$	*d.* 3 - $\frac{1}{80}$ of *l.* +$\frac{1}{2}$ - $\frac{1}{6}$ of 3*d.*	5$\frac{3}{4}$	*d.* 3 - $\frac{1}{80}$ of *l.* +2 - $\frac{1}{120}$ of *l.* +$\frac{3}{4}$ - $\frac{1}{4}$ of 3*d.*
1$\frac{1}{2}$	*d.* 3 - $\frac{1}{80}$ of *l.* 1$\frac{1}{2}$ - $\frac{1}{2}$ of 3*d*	3$\frac{3}{4}$	*d.* 3 - $\frac{1}{80}$ of *l.* +$\frac{3}{4}$ - $\frac{1}{4}$ of 3*d.*	6	*d.* 6 - $\frac{1}{40}$ of *l.*
1$\frac{3}{4}$	*d.* 2 - $\frac{1}{120}$ of *l.* —$\frac{1}{4}$ - $\frac{1}{8}$ of 2*d.*	4	*d.* 4 - $\frac{1}{60}$ of *l.*	6$\frac{1}{4}$	*d.* 3 - $\frac{1}{80}$ of *l.* +3 - $\frac{1}{80}$ of *l.* +$\frac{1}{4}$ - $\frac{1}{12}$ of 3*d.*
2	*d.* 2 - $\frac{1}{120}$ of *l.*	4$\frac{1}{4}$	*d.* 3 - $\frac{1}{80}$ of *l.* +1 - $\frac{1}{3}$ of 3*d.* +$\frac{1}{4}$ - $\frac{1}{4}$ of 1*d.*	6$\frac{1}{2}$	*d.* 6 - $\frac{1}{40}$ of *l.* +$\frac{1}{2}$ - $\frac{1}{12}$ of 6*d.*
$\frac{1}{4}$	*d.* 2 - $\frac{1}{120}$ of *l.* +$\frac{1}{}$ - $\frac{1}{}$ of 2*d*	4$\frac{1}{2}$	*d.* 3 - $\frac{1}{80}$ of *l.* +1$\frac{1}{2}$ - $\frac{1}{2}$ of 3*d.*		

Price	Divisors.	Price	Divisors.	Price	Divisors.
d.	*d.*	*d.*	*d.*	*d.*	*s.*
$6\frac{3}{4}$	6 - $\frac{1}{40}$ of *l.* +$\frac{3}{4}$ - $\frac{1}{8}$ of 6*d.*	$8\frac{3}{4}$	6 - $\frac{1}{40}$ of *l.* +2 - $\frac{1}{3}$ of 6*d.* +$\frac{3}{4}$ - $\frac{1}{8}$ of 6*d.*	$10\frac{1}{2}$	1 - $\frac{1}{20}$ of *l.* *d.* —$1\frac{1}{2}$ - $\frac{1}{8}$ of 1*s.*
7	*d.* 6 - $\frac{1}{40}$ of *l.* +1 - $\frac{1}{6}$ of 6*d.*	9	*d.* 6 - $\frac{1}{40}$ of *l.* +3 - $\frac{1}{2}$ of 6*d.*	$10\frac{3}{4}$	*d.* 6 - $\frac{1}{40}$ of *l.* +4 - $\frac{1}{60}$ of *l.* +$\frac{3}{4}$ - $\frac{1}{8}$ of 6*d.*
$7\frac{1}{4}$	*d.* 6 - $\frac{1}{40}$ of *l.* +1 - $\frac{1}{6}$ of 6*d.* +$\frac{1}{4}$ - $\frac{1}{4}$ of 1*d.*	$9\frac{1}{4}$	*d.* 6 - $\frac{1}{40}$ of *l.* +3 - $\frac{1}{2}$ of 6*d.* +$\frac{1}{4}$ - $\frac{1}{12}$ of 3*d.*	11	*s.* 1 - $\frac{1}{20}$ of *l.* *d.* —1 - $\frac{1}{12}$ of 1*s.*
$7\frac{1}{2}$	*d.* 6 - $\frac{1}{40}$ of *l.* +$1\frac{1}{2}$ - $\frac{1}{4}$ of 6*d.*	$9\frac{1}{2}$	*d.* 6 - $\frac{1}{40}$ of *l.* +3 - $\frac{1}{2}$ of 6*d.* +$\frac{1}{2}$ - $\frac{1}{6}$ of 3*d.*	$11\frac{1}{4}$	*d.* 8 - $\frac{1}{30}$ of *l.* +3 - $\frac{1}{80}$ of *l.* +$\frac{1}{4}$ - $\frac{1}{12}$ of 3*d.*
$7\frac{3}{4}$	*d.* 6 - $\frac{1}{40}$ of *l.* +$1\frac{1}{2}$ - $\frac{1}{4}$ of 6*d.* +$\frac{1}{4}$ - $\frac{1}{6}$ of $1\frac{1}{2}$*d*	$9\frac{3}{4}$	*d.* 6 - $\frac{1}{40}$ of *l.* +3 - $\frac{1}{2}$ of 6*d.* +$\frac{3}{4}$ - $\frac{1}{4}$ of 3*d.*	$11\frac{1}{2}$	*d.* 8 - $\frac{1}{30}$ of *l.* +3 - $\frac{1}{80}$ of *l.* +$\frac{1}{2}$ - $\frac{1}{6}$ of 3*d.*
8	*d.* 8 - $\frac{1}{30}$ of *l.*	10	*d.* 8 - $\frac{1}{30}$ of *l.* +2 - $\frac{1}{4}$ of 8*d.*	$11\frac{3}{4}$	*d.* 8 - $\frac{1}{30}$ of *l.* +3 - $\frac{1}{80}$ of *l.* +$\frac{3}{4}$ - $\frac{1}{4}$ of 3*d.*
$8\frac{1}{4}$	*d.* 6 - $\frac{1}{40}$ of *l.* +2 - $\frac{1}{3}$ of 6*d.* +$\frac{1}{4}$ - $\frac{1}{8}$ of 2*d.*	$10\frac{1}{4}$	*d.* 8 - $\frac{1}{30}$ of *l.* +2 - $\frac{1}{4}$ of 8*d.* +$\frac{1}{4}$ - $\frac{1}{8}$ of 2.		
$8\frac{1}{2}$	*d.* 6 - $\frac{1}{40}$ of *l.* +2 - $\frac{1}{3}$ of 6*d.* +$\frac{1}{2}$ - $\frac{1}{4}$ of 2*d*				

An Explanation *of the preceding* Table.

Seek in the Columns under the word *Price* for the given Price of any Commodity, againſt which you will find the Diviſors by which any given Quantity is to be divided for the Anſwer in Pounds, thus againſt 3*d.* you find 3*d.* - $\frac{1}{80}$ of *l.* ſo that when the Price is 3*d.* any given Quantity being divided by 80, the Quotient is the Anſwer.

Where this Character — is prefixed (as in the ſecond Line againſt 1$\frac{3}{4}$*d.*) it ſignifies that the Anſwer is found by *Subtracting* the laſt Quotient from the firſt. See the third Example following.

Where this Character + is prefixed (as in the ſecond Line againſt 2$\frac{1}{4}$*d*), it denotes the reſpective Quotients to be *added*. See the fourth Example.

Where no Character is prefixed, the *laſt Quotient* is the Anſwer; as in the 1ſt and 2nd Examples.

The *Reaſon* of dividing as directed in the Table is plain by the Table itſelf; for Inſtance, ſuppoſe the amount of any Quantity were required at 4$\frac{1}{2}$d *per Yard* or *per Piece*, &c. the Table directs you firſt to divide the given Quantity by 80, becauſe 3d is the eightieth part of a Pound; and then you are to divide that Quotient by 2, becauſe 1$\frac{1}{2}$d is the half of 3d. conſequently the Sum of the Quotients will be the Anſwer.

But the following Examples will illuſtrate the whole, and more fully ſhew the Reaſon of the Directions preſcribed in the Table; and the Reaſons of the Operations being known, the Learner may then be able (with a little practice) to work any Queſtion himſelf without the help of the Table, which indeed is the principal Thing to be aimed at; for a Man would not be very fit to tranſact Buſineſs, that, to do a Sum in Practice, was under the neceſſity of applying to a Table for Directions: the Deſign therefore of the Table is chiefly to initiate the Learner in the Rule, and at the ſame time ſhew him the ſhorteſt way of performing any Operation in this Caſe.

Note, The Quotients in the following Operations are always placed in a Line with the Diviſors, and may be continued only to *four* Decimal Places.

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Exam. 1. 3600 Yards at ¼ *per Yard.*
d.
3 is $\frac{1}{80}$ of a *l.* 45.0 = 3600 ÷ 80
¼ is $\frac{1}{12}$ of that 3.75 = 45 ÷ 12

Hence the Anſwer is 3*l.* 15*s.*

Exam. 2. 504 Yards at 1¼ *d. per* Yard.
s. d.
2 : 6 - ⅛ of a *l.* 63
5 - ½ of that 10.5
l. s. d.
1¼ - ¼ of that 2.625 = 2 : 12 : 6, the Anſwer.

Ounces. d.
Ex. 3. 756½ = 756.5 at 1¾ *per* Ounce.
d.
2 - $\frac{1}{120}$ of a *l.* 6.3041
¾ - ⅛ of that .7880 Subtract.
l. s. d.
Remains the Anſ. 5.5161 = 5 : 10 : 3¾

Ounces. d.
Ex. 4. 3257¼ = 3257.25 at 2¼ *per* Ounce.
d.
2 - $\frac{1}{120}$ of a *l.* 27.1437 } Add
¼ - ⅛ of that 3.3929 }
l. s. d.
Sum, the Anſwer 30.5366 = 30 : 10 : 8¾

Ex.

Ounces. *d.*
Ex. 5. 1732$\frac{3}{4}$=1732.75 at 4$\frac{1}{4}$,
d.
3 - $\frac{1}{80}$ of a *l.* 21.6593
1 - $\frac{1}{3}$ of that 7.2197
$\frac{1}{4}$ - $\frac{1}{4}$ of that 1.8049
l. *s.* *d.*
Sum, the Anſwer, 30.6839=30 : 13 : 8

Exam. 6. 876$\frac{1}{8}$=876.125 at 5$\frac{3}{4}$*d.*
d.
3 - $\frac{1}{80}$ of *l.* 10.9515=876.125÷ 80
2 - $\frac{1}{120}$ of *l.* 7.3010=876.125÷120
$\frac{3}{4}$ - $\frac{1}{4}$ of 3*d.* 2.7378=10.9515÷ 4
l. *s.* *d.*
Sum, the Anſ. 20.9903=20 : 19 : 9$\frac{1}{2}$

Examp. 7. 735$\frac{3}{8}$=735.375 at 8$\frac{3}{4}$*d.*
6 $\frac{1}{40}$ of a *l.* 18.3843
2 $\frac{1}{3}$ of that 6.1281
$\frac{3}{4}$ $\frac{1}{8}$ of 6 *d.* 2.298
l. *s.* *d.*
Sum, the Anſwer, 26.8104=26 : 16 : 2$\frac{1}{2}$

Examp. 8. 496$\frac{7}{8}$=496.875 at 10$\frac{1}{2}$ *d.*
s.
1 - $\frac{1}{20}$ of a *l.* 24.8437
1$\frac{1}{2}$*d.* $\frac{1}{8}$ of that 3.1054 Subtract.
l. *s.* *d.*
Remains the Anſ. 21.7383=21 : 14 ; 9

Exam.

Examp. 9. $647\frac{3}{16}$=647.1875 at $10\frac{3}{4}$ *d.*

d.		
6	$\frac{1}{40}$ of a *l.*	16.1797
4	$\frac{1}{60}$ of a *l.*	10.7864
$\frac{3}{4}$	$\frac{1}{8}$ of 6 *d.*	2.0224

l. *s.* *d.*

Sum, the Anſwer, 28.9885=28 : 19 : $9\frac{1}{4}$ *d.*

Examp. 10. $976\frac{11}{16}$=976.6875 at $11\frac{3}{4}$

d.		
8	$\frac{1}{30}$ of a *l.*	32.5562
3	$\frac{1}{80}$ of a *l.*	12.2086
$\frac{3}{4}$	$\frac{1}{4}$ of that	3.0521

l. *s.* *d.*

Sum, the Anſwer, 47.8169=47 : 16 : 4

CASE II.

When the Price is *any Number of Shillings*, the Anſwer may be found much the ſame as in the laſt Caſe, by taking *aliqnot Parts* of a Pound, but a more general Rule is to turn the Shillings into the *Decimal* of a Pound; and *multiply* the given Quantity by ſuch Decimal, which is often the ſhorteſt Way, eſpecially when the Price is an *even* Number of Shillings.

Gallons. *s.*
Ex. 1. $674\frac{1}{2}$=674.5 at 6 *per* Gallon.
Multiply by .3 the Decimal of 6 Shill.

Anſwer, 202.35=202 *l.* 7 *s.*

s. l.
Examp. 2. 725$\frac{2}{5}$=725.4 at 14 (=.7)
.7
l. s. d.
Anſwer, 507.78=507 : 15 : 7$\frac{1}{4}$

If the Price is at ſo much *per* 100, divide the Product by 100, or if at ſo much *per* 1000, divide by 1000.

s. l.
Examp. 3. 37216 at 5 (=.25) *per* 100
.25
186080
74432
l. s. d.
Prod.÷100=93.0400=93 : — : 9$\frac{1}{2}$

The laſt Example proved by taking the *Aliquot Part* of a *Pound.*

372.16 at 5 *s. per* 100
s.
5 - $\frac{1}{4}$ of a *l.* 93.04 the Anſwer as before.

s. l.
Examp 4. 53176 at 17 (=.85) *per* 1000
.85
265880
425408
l. s.
Prod.÷1000=45.19960=45 : 4, nearly.

The ſame proved.

53.176 at 17 *s. per* 1000

s.		
10	- ½ of a *l.*	26.588
5	- ½ of that	13.294
2	- ⅕ of 10 *s.*	5.3176
The Sum,		*l.* 45.1996 the Anſwer as before.

CASE III.

When the Price is *Shillings and Pence*, which are *an Aliquot Part* of a *Pound*, *divide* the Quantity by the Number expreſſing ſuch Part.

Buſh. Gal. Buſh. s. d.
Ex. 1. 758 : 3=758.375 at 2 : 6 *per Buſhel.*
s. d. *l. s. d.*
2 : 6 - ⅛ of *l.* 94.797=94 : 15 : 11¼, the Anſwer.

Buſh. Gal. s. d.
Ex. 2. 846 : 7=846.875 at 6 : 8 *per Bnſhel.*
s. d. *l. s. d.*
6 : 8 - ⅓ of *l.* 282.2916= 282 : 5 : 10, the Anſwer.

CASE IV.

When the Price *is not* an Aliquot Part of a Pound, the Anſwer may be found by working for the Shillings ſeparately; and Pence, or Pence and Farthings ſeparately, as directed in the 2d and 1ſt *Caſes*; or otherwiſe by taking Aliquot Parts promiſcuouſly for the Shillings and Pence together. In the following Examples both Methods are uſed, which may ſerve as Proofs to each other.

Examp.

Yds. *Q.* *N.* *Yards.* *s.* *d.*
Ex. 1. 757 : 2 : 2=757.625 at 4 : 4 *per Yard.*
Multiply by .2 the Dec. of 4 *s.*

d. 151.5250
4 - $\frac{1}{60}$ of *l.* 12.6271=757.625÷60
l. *s.* *d.*
The Sum, 164.1521=164 : 3 : — ½ the Anſ.

s. *d.*
Again, 757.625 at 4 : 4
s.
4 - $\frac{1}{5}$ of *l.* 151.525
4*d.* - $\frac{1}{12}$ of that 12.627

The Sum, *l.* 164.152 as before.

E.Eng. *Q.* *N.* *Ells.* *s.* *d.*
Exam. 2. 641 : 3 : 3=641.75 at 17 : 6 *per Ell.*
Mult. .85

32.0875
d. 513.400
6 - $\frac{1}{40}$ of *l.* 16.0437
l. *s.* *d.*
Sum, 561.5312=561 : 10 : 7½ the Anſ.

s. *d.*
Again, 641.75 at 17 : 6.
s.
10 - ½ of a *l.* 320.875
5 - ½ of that 160.4375
2:6 - ½ of that 80.2187

l. 561.5312 as before.

	C.	qrs.	lb.		C.		s.	d.	
Exam. 3.	658	: 3	: 22	=	658.9464	at	19	: 8	*per* C.

	658.9464
	.95
	32.947320
d.	593.05176
8 - $\frac{1}{30}$ of *l.*	21.96488

	l.	*s.*	*d.*
Anſwer, 647.9639 =	647	: 19	: 3¼

Again,	658.9464 at 19 : 8
s.	
10 - $\frac{1}{2}$ of *l.*	329.4732
5 - $\frac{1}{2}$ of that	164.7366
4 - $\frac{1}{5}$ of *l.*	131.7893
8*d.* - $\frac{1}{6}$ of that	21.9648
	l. 647.9639 as before.

	C.	qrs.	lb.		C.		s.	d.	
Exam. 4.	854	: 3	: 26	=	854.9821	at	16	: 4½	*per* C.

	854.9821
	.8
d.	683.98568
4 - $\frac{1}{60}$ of *l.*	14.2497
½ - $\frac{1}{8}$ of that	1.7812

	l.	*s.*	*d.*
Anſwer, 700.0166 =	700	: —	: 4

Again,	854.9821 at 16 : 4½
s.	
10 - $\frac{1}{2}$ of *l.*	427.4910
5 - $\frac{1}{2}$ of that	213.7455
1 : 3*d.* - $\frac{1}{4}$ of that	53.4364
1½ - $\frac{1}{10}$ of that	5.3436
	l. 700.0165 as before.

Examp. 5. If a Dividend of 13 *s.* 3 *d.* in the Pound is paid for a Debt of 526 *l.* 10 *s.* how much will it amount to?

l. *s.* *d.*
526.5 at 13 : 3 *per l.*
.65

26.325
d. 315.90
3 - $\frac{1}{80}$ *l.* 6.5812
l. *s.* *d.*
Anſwer, *l.* 348.8062=348 : 16 : $1\frac{1}{2}$

s. *d.*
Again, 526.5 at 13 : 3
s.
10 *d.* - $\frac{1}{2}$ of *l.* 263.25
2 : 6 - $\frac{1}{4}$ of that 65.8125
6 - $\frac{1}{5}$ of that 13.1625
3 - $\frac{1}{2}$ of that 6.5812

l. 348.8062 as before.

CASE V.

When the Price is *only Pounds* multiply the given Quantity by them.

When 'tis *Pounds* and *Shillings*, multiply by the Pounds, and the Decimal of the Shillings; or, multiply by the Pounds, and take aliquot Parts for the Shillings.

Note, when the given Price is *more* than a Pound, any broken Quantity muſt be expreſſed to *five Places*; and if above 10 Pounds to *ſix Places* of Decimals.

T. *C.* *qr.* *℔.* *Tuns.*
Ex. 1. 57 : 12 : 1 : 16 = 57.61964 at *l.* 4 *per Tun.*
Multiply by 4
l. *s.* *d.*
Anſwer, *l.* 230.47856 = 230 ; 9 : $6\frac{3}{4}$

T. *C.* *qr.* *℔.* *Tuns.* *l.* *s.*
Ex. 2. 96 : 18 : 2 : 24 = 96.93571 at 6 : 15 *per Tun.*
Multiply 57.6 the Price invert.

581.6143
67.8556
4.8468
l. *s.* *d.*
Anſwer *l.* 654.3161 = 654 : 6 : 3^{3}

Again, 96.93571 at 6 *l.* 15 *s.*
Multiply by 6

s. 581.61426
15 - $\frac{1}{8}$ of 6 *l.* 72.70178 = 581.61 &c. ÷ 6

l. 654.31604 as before.

CASE VI.

If beſides *Pounds* and *Shillings* there are *Pence* in the given Price, the amount of the two former may be found as in the 1ſt Method of the above Example, and the *Pence* by *Caſe* 1. Or otherwiſe the Quantity may be multiplied by the Pounds, and Aliquot Parts taken promiſcuouſly for the Shillings and Pence. The following Examples are wrought both ways.

Ex-

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Oz. P.w. gr. *Ounces* *l. s. d.*
Ex. 1. 47 : 14 : 18=47.7375 at 3 : 15 : 5 *per oz.*
Mult. by 57.3 the Dec. of 3*l.* 15*s.* invert.

143.2125
33.4163
d 2.3868
4 - $\frac{1}{60}$ of *l.* .7956
1 - $\frac{1}{4}$ of that .1989

l. s. d.
Anſwer 180.0101 = 180 : - : 2$\frac{1}{2}$

l. s. d.
Again, 47.7375 at 3 : 15 : 5
3

s. 143.2125
10 - $\frac{1}{2}$ of *l.* 23.8687
5 - $\frac{1}{2}$ of that 11.9344
5*d* - $\frac{1}{12}$ of that .9945

180.0101 as before.

Oz. P.w. gr. *Ounces* *l. s. d.*
Ex. 2. 54 : 9 : 14=54.47916 at 3 : 18 : 7$\frac{1}{2}$ *per Oz.*
Mult. by 3.9 = 3 : 18

49.031244
d. 163.43748
6 - $\frac{1}{40}$ of *l.* 1.3619
1$\frac{1}{2}$ - $\frac{1}{4}$ of that .3405

l. s. d.
Anſwer 214.1711 = 214 : 3 : 5

l. s. d.
Again, 54.47916 at 3 : 18 : 7$\frac{1}{2}$
3

s. 163.43748
12 - $\frac{1}{5}$ of 3*l.* 32.6875
6 - $\frac{1}{2}$ of that 16.3437
6*d.* - $\frac{1}{12}$ of that 1.3619
1$\frac{1}{2}$ - $\frac{1}{4}$ of that .3405

l. 214.1711 as before.

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℔. *oz.* P.*w.* *gr.* ℔ *l.* *s.* *d.*

Ex. 3. 87 : 10 : 18 : 6 = 87.909375 at 14 : 12 : 10 *per* ℔.

Mult. by 6.41 the Dec. of 14*l.* 12*s.* invert.

879.0938

351.6375

d. 52.7456

6 - $\frac{1}{40}$ of *l.* 2.1977

4 - $\frac{1}{60}$ of *l.* 1.4651

l. *s.* *d.*

Anſwer. 1287.1397 = 1287 : 2 : 9$\frac{1}{2}$

l. *s.* *d.*

Again, 87.909375 at 14 : 12 : 10

14

s. 1230.721250

10 - $\frac{1}{2}$ of *l.* 43.9547

2 - $\frac{1}{5}$ of that 8.7909

10*d.* - $\frac{1}{12}$ of 10*s.* 3.6629

l. 1287.1397 as before.

T. *H.* *ga.* *Tuns* *l.* *s.* *d.*

Ex. 4. 16 : 3 : 53 = 16.960317 at 28 : 7 : 2 *per* Tun.

Mult. by 53.82 the Dec. of 28*l.* : 7*s.* inv.

339.2063

135.6825

5.0881

d. .8480

2 - $\frac{1}{120}$ of *l.* .1413

l. *s.* *d.*

Anſwer. 480.9662 = 480 : 19 : 3$\frac{3}{4}$

l. *s.* *d.*

Again, 16.960317 at 28 : 7 : 2

28

135.682536

s. *d.* 339.20634

6 : 8 - $\frac{1}{3}$ of *l.* 5.6534

6 - $\frac{1}{40}$ of *l.* .4240

l. 480.9663 as before.

The Examples in this Caſe (or indeed any Sums in Practice) may alſo be done without taking any Aliquot Parts at all, that is by multiplying the Quantity by the *whole* of the given Price, both Shillings and Pence, (and Farthings if any) being expreſſed decimally, but the Methods already taught will generally be found ſhorter than that I am now ſpeaking of, eſpecially if the Operations on both ſides are performed without Decimal Tables, but that the Reader may ſee all the Methods of Decimal Practice, I ſhall here work the laſt Example wholly by Multiplication.

```
         Tuns         l.   s.  d.   l.
         16.960317 at 28 : 7 : 2 =28.358333 per Tun
Mul. by  333853.82  the Price inverted
         ---------
          339.2063
          135.6825
            5.0881
             .8480
             .1357
                51
                 5
         ---------
Product l. 480.9662  the Anſwer as before
```

CHAP. IV.

The Uſe of DECIMALS, *in* Tare *and* Trett.

Groſs Weight, is the Weight of a Commodity, including the Weight of the *Caſk*, *Cheſt*, &c. wherein the Goods are contained.

Tare, is an allowance for the Weight of the *Caſk*, *Cheſt*, &c. and is uncertain according to the Package of Goods.

Trett, is an allowance for the *Waſte*, *Dirt*, &c. that is in any Goods, and is always 4℔ in 104.

When the *Tare* is ſubtracted from the *Groſs Weight*, if no *Trett* is allowed, the Remainder is called *Neat Weight*.

But if both *Tare* and *Trett* are allowed, the *Tare* being ſubtracted, the Remainder is called *Suttle*, from which the *Trett* being taken, the Remainder is *Neat Weight*.

There are many ways of ſolving Queſtions in this Rule, but I think the beſt way of finding the *Tare*, is to work by Aliquot Parts, provided the Practitioner be ready in thoſe which follow, *viz.*

$$\begin{array}{l}\text{℔}\\ \left.\begin{array}{l}16 \text{ is } \frac{1}{7}\\ 14 - \frac{1}{8}\end{array}\right\}\text{of a } C.\ wt.\end{array}\qquad \begin{array}{l}\text{℔}\\ \left.\begin{array}{l}8 \text{ is } \frac{1}{7}\\ 7 - \frac{1}{8}\end{array}\right\}\ 2\ qrs.\end{array}\qquad \begin{array}{l}\text{℔}\\ \left.\begin{array}{l}7 \text{ is } \frac{1}{4}\\ 4 - \frac{1}{7}\end{array}\right\}\text{of } 1\ qr.\end{array}$$

Note, In this Rule, *three Places* of Decimals are generally ſufficient for the odd Weight.

Ex. 1. What's the *Neat* Weight of 256C. 2qrs. 19℔. *Tare* 14℔. *per* C.

$$\begin{array}{llll} \text{℔} & & 256.669 & \text{the } Groſs \text{ wt.}\\ 14 - - \frac{1}{8}C & & \underline{32.083} & \text{the } Tare\text{, which Subtract}\\ \text{Remains} & & 224.586 = 224C.\ 2qrs.\ 9\text{℔}. & \text{the } Neat\ wt. \end{array}$$

C. qrs. ℔. ℔:
Ex. 2. What's the *Neat* Wt. of 74 : 3 : 12. *Tare* 18 *per* C.

	74.857	The *Groſs* wt.
℔		
16 - $\frac{1}{7}$C.	10.694	Add
2 - $\frac{1}{8}$of that	1.336	
Subſtract	11.030	the *Tare*
Remains	63.827 = 63C. 3qrs. 8℔. *Neat* wt.	

C. qrs. ℔. ℔.
Ex. 3. What's the *Neat* Wt. of 348 : 3 : 24, *Tare* 17 *per* C.

	384.964	The *Groſs* Wt.
℔.		
14 - $\frac{1}{8}$ of C.	48.120	Add
2 - $\frac{1}{7}$ of that	6.874	
1 - $\frac{1}{2}$ of that	3.437	
Sub.	58.431	the *Tare*
		C. qrs. ℔.
Remains	326.533 = 326 : 2 : 3 *Neat* wt.	

C qrs. ℔. ℔.
Ex. 4. What's the *Neat* Wt. of 548 : 2 : 23, *Tare* 15 *per* C.

	548.705	the *Groſs* wt.
qrs.		
2 - $\frac{1}{2}$ of C.	274.357	
℔ qrs.		
8 - $\frac{1}{7}$ of 2	39.194	Add
7 - $\frac{1}{8}$ of 2	34.294	
Sub.	73 488	the *Tare*
Remains	475.217 = 475C. and 24℔. *Neat* wt.	

The Reaſon of beginning this Example with 2*qrs. is the* $\frac{1}{2}$ *of C.* is for the more eaſy taking parts for the 15℔.

Anothe

Another Method of finding the Neat weight when only *Tare* is allowed, is to multiply the *Groſs* Weight by the *Decimal* of the *Neat* Weight of a Hundred.

C. qrs. ℔.
Example What's the *Neat* Wt. of 256 : 2 : 19 *Tare* 14℔ *per* C.

	qrs. ℔.		
From	4 :	then mult	256.669 *Groſs* wt.
Subtr.	- : 14	by	578.0 the *Neat* of 1*C*. inv.
Rem.	3 : 14 = .875 the *Neat of* 1 *C.*		205.335 17.967 1.283
		Prod.	224.585 the *Neat*

Weight as before in *Example* 1.

Thus much for finding the *Neat* Weight when *Tare only* is allowed, the next thing is to find the *Neat* when there is an allowance of *both Tare and Trett.*

It has been before obſerved that the allowance for *Trett* is always 4℔. in 104, which is 1℔. in 26: So that the *Tare* being ſubtracted from the *Groſs* wt. and the Remainder (called *Suttle)* divided by 26, the Quotient is the *Trett*, which ſubtracted from the *Suttle*, gives the *Neat* weight.

Example 5. What's the *Neat* Wt. of 375 C : 1 qr. : 15 ℔., *Tare* 13℔. *per* C. and *Trett* 4℔, *per* 104?

	375.384	*Groſs*
qrs.		
2 - - $\frac{1}{2}$ of C. --	187.692	
℔.		
8 - - $\frac{1}{7}$ of that	26.813	add
4 - - $\frac{1}{2}$ of that	13.406	
1 - - $\frac{1}{4}$ of that	3.351	
Subtract the Sum	43.570	the *Tare*
Remains --	331.814	*Suttle*
from which Sub.	12.762	the *Trett*, found as below.
Remains. --	319.052	= 319C. and 6℔. nearly, the *Neat* Wt.

Suttle

26)331.814(
26
71
52
198
182
161
156
54
52
2

Trett

12.762
26
76572
25524
2
331.814

The *Suttle* in the foregoing Example may alſo be found in the ſame manner as the *Neat Weight* in the Example preceding it, thus

	qrs.	℔.				
from	4 :			then mult.	375.384	Groſs
Subtr.	- :	13		by	929388.0	the *Sut.* of 1C. inv.
Rem.	3 :	15	= .883929		300.307	
	the *Suttle* of 1C.				30.031	
					1.126	
					.338	
					8	
					3	
				Product	331.813	the *Suttle* as before

This Method may ſerve as a Proof to the other in regard to the *Suttle*, and the beſt way of proving the *Trett* is to multiply it by 26, as in the Work.

C. qrs. ℔.

Example 6. In 57 Butts Currants weighing 732 : 1 : 11 *Groſs*, *Tare* 19℔. *per* Butt, and *Trett* 4 *per* 104; how many C. *Neat*?

℔.		57. Butts,	*Tare* at 19℔.
16 - -	$\frac{1}{7}$ of C.	8.143	
2 - -	$\frac{1}{8}$ of that	1.018	
1 - -	$\frac{1}{2}$ of that	0.509	
	Tare	9.670	which ſubtract
	from	732.348	*Groſs* wt.
Remains		722.678	*Suttle* which divide by 26 and
Sub. the Quo.		27.795	*Trett*
Remains		694.883	= 694C. 3qrs. 15℔. *Neat*.

CHAP. V.

The Uſe of DECIMALS *in the* Rules *of* Fellowſhip.

By the *Rules of Fellowſhip*, the Accounts of ſeveral Partners trading in a Company, are ſo adjuſted or made up, that every Partner may have his juſt Part of the Gain, or ſuſtain his juſt Part of the Loſs; according to the Proportion or Share of Money he hath in the *Joint-Stock*.

Sect. 1. *The* Single Rule *of* Fellowſhip; *or that without* Time.

By the *Single Rule of Fellowſhip* is adjuſted the Accounts of thoſe Partners, that put all their ſeveral and perhaps different Sums of Money, into a common Stock at one and the ſame Time; and all Queſtions of this Nature are anſwered by ſo many ſeveral Operations in the *Rule of Three Direct*, as there are Partners in the Stock: For *as the whole Stock, is to the whole Gain or Loſs; ſo is each Man's particular Share, to his particular Share of the Gain or Loſs.*

Example. Suppoſe 3 Partners, A, B, and C, make a *Joint Stock* in this manner,

	l.	*s.*	*d.*		*l.*
A puts in	325	7	6	=	325.375
B———	217	5	-	=	217.25
C———	175	17	6	=	175.875
the whole Stock	718	10	-	=	718.500

With this Stock they trade and gain 125 *l.* : 12 *s.* : 10 *d.* = 125.6416 *l.* it is required to find each Man's Share or Part of the Gain.

For the reſpective Shares, ſay,

l.	*l.*	*l.*	*l.*	
As 718.5 :	125.6416	:: 325.375 :	56.897	A's Share
		:: 217.25 :	37.9896	B's Share
		:: 175.875 :	30.7546	C's Share

The Sum of the ſeveral Shares 125.6412

Which being the ſame with, or equal to, the *whole Gain*, always proves the *Truth* of the Work.

But as the firſt and ſecond Terms are common to every Proportion in *this* and in all Caſes in the Rules of Fellowſhip, therefore any Queſtion may be ſooneſt anſwered by the 2d *Rule*, *Page* 58, namely, by dividing the ſecond Term by the firſt, which will give the *Gain* or *Loſs* of one Pound; and then by *that* to multiply each man's particular Share of the Stock, the ſeveral *Products* will be each man's Share of the Gain or Loſs.

Thus, as *l.* 718.5 : *l.* 125.6416 :: *l.* 1 : *l.* .174866 the common Multiplier.

A's part of Stock	325.375	B's part of Stock	217.250
Multiplier invert.	668471.0	Mult. inverted.	668471.0
	32.5375		21.7250
	22.7762		15.2075
	1.3015		.8690
	.2603		.1738
	195		130
	20		13
A's Part of Gain	56.8970	B's Part of Gain	37.9896

C's Part of Stock	175.875
	668471.0
	17.5875
	12.3113
	.7035
	.1407
	105
	11
C's Part of Gain	30.7546

Here every man's Share is as before.

Sect. 2. Double Fellowſhip, *or That with* Time.

Fellowſhip with Time conſiders the *Share* of the *Gain* or *Loſs* with regard to the *Money*, and the *Time* it was employed, and proportionates it to *both* by the following

RULE.

Multiply each Man's Stock by the Time it was employed; then ſay, as the Sum of thoſe Products, is to the whole Gain or Loſs; ſo is every one of the Products, to its proportional Part of the Gain or Loſs.

Example. Four Merchants A, B, C, and D, enter into Partnerſhip thus,

	l.	*s.*		
A puts in	64 :	10	for 4½	Months
B ——	78 :	15	— 6	
C ——	112 :	14	— 8¾	
D ——	125 :	5	— 5¼	

They traffick and Gain 108 *l.* 18 *s.* 4½ *d.*= 108.91875 *l.* It is required to find every Man's Share of the Gain, according to the Stock and Time it was employed.

		l.		*Months*		*Products*
First	A's Stock	64.5	×	4.5	=	290.25
	B's Stock	78.75	×	6.	=	472.5
	C's Stock	112.7	×	8.75	=	986.125
	D's Stock	125.25	×	5.25	=	657.5625
	The Sum of the Products.					2406.4375

Then, as

			l.	
2406.4375 : 108.91875	:: 290.25	:	13.137	for A
	:: 472.5	:	21.3859	for B
	:: 986.125	:	44.633	for C
	:: 657.5625	:	29.762	for D
	The whole Gain nearly		108.9179	

To work this by the ſhorter Method of finding the proportional Part of the Gain due to one Pound, it will be,

As 2406.4375 : 108 91875 : : 1 : .045261 the common Multiplier, then the Operations will be as follow:

	290.250		472.500
Multiplier invert.	162540.0		162540.0
	11.6100		18.9000
	1.4513		2.3625
	580		945
	174		284
	3		5
A's Gain	13.1370	B's Gain	21.3859
	986.125		657.5625
	162540.0		162540.0
	39.4450		26.3025
	4.9306		3.2878
	.1972		.1315
	592		395
	10		7
C's Gain	44.6330	D's Gain	29.7620

Their ſeveral Shares as before.

CHAP. VI.

The Uſe of DECIMALS *in* Barter.

BARTER is the exchanging of one *Commodity* for another, and informs Merchants ſo to proportion their *Quantities*, as that neither may ſuſtain *Loſs*.

The Method of reſolving any Queſtion herein depends wholly upon a clear Underſtanding of the *Rule of Three Direct* and *Inverſe*.

QUESTION I.

How many Hundred of Hops at 5 *l.* 15 *s.* *per Hundred*, muſt be given in Barter for 18 *C.* 3 *qrs.* 21 ℔. of Cheeſe at 1 *l.* 12 *s.* *per C?*

```
     l.       C.        l.
If 1.6———18.9375———5.75
                .4×4=1.6
         ————————
          7.57500
              4
         ————————        C. qr. ℔.
   5.75)30.300(5.27=5 : 1 : 2 Anſwer.
        2875
        ————
         1550
         1150
        —————
          4000
          4025
         —————
```

This (or any Queſtion of the like Kind) may be proved, by finding the true Value of that Commodity whoſe Quantity is given, (which here is Cheeſe) and then find how much of the other Commodity will amount to that Sum at the Rate propoſed.

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QUESTION II.

How many Gallons of Brandy at 5 *s.* 6 *d.* *per* Gallon, ſhall I have in Barter for 15 Hund. Hops at 4 *l.* 15 *s.* *per C.*?

l. *s.* *s.* 5) C. 5) *s.*

4 : 15=95——15——5.5

3 3 1.1

1.1)285.0

259.09 Gallons, the Anſwer.

Note, The Reaſon of dividing the ſecond and third Numbers by 5 is only to ſhorten the Work; for the *firſt* and *third*, or *ſecond* and *third* Numbers, in the *Rule of Three Inverſe*, may at any Time be divided by any Number that will divide both without a Remainder. So alſo in the *Rule of Three Direct*, the *firſt* and *ſecond*, or *firſt* and *third* Numbers, may be divided by any Number that will divide them, leaving no Remainder.

QUESTION III.

Two Merchants, *A* and *B*, barter; *A* would exchange 5 *C.* 3 *qrs.* 14 lb. of Pepper, which is worth 3 *l.* 10 *s.* *per* C. with *B* for Cotton worth 10 *d.* *per* Pound. How much Cotton muſt *B* give *A* for his Pepper?

l. *d.* *C.* *d.*

If 3 : 10——5.875——10

20 840

70 235000

12 47000

840

The Product ÷10 = 493.5000 the Anſwer in Pounds

which divide by 112)448 (=4 *C.* 1 *qr.* 17½ lb.

lb. 45½

QUES-

QUESTION IV.

Two Merchants, *A* and *B*, barter thus; *A* hath 86 Yards of Broad Cloth worth 9 *s.* 2 *d.* *per* Yard ready Money; but in Barter he will have 11 *s.* *per* Yard. *B* hath Shalloon worth 2 *s.* 1 *d.* ready Money; it is required to find how many Yards of the Shalloon *B* muſt give to *A* for his Cloth, to make his Gain in the Barter equal to that of *A*'s.

In ſolving this Queſtion, the advanced Price of *B*'s Shalloon muſt firſt be found.

s. *d.* *s.* *s.* *d.*
Thus, if 9 : 2 —— 11 —— 2 : 1
12 25 12
110 - -)275 25
2.5 *s.* the advanced Price of *B*'s Shalloon.

s. *Yards.* *s.*
Then, if 11 —— 86 —— 2.5
11

$.5 \times 5 = 2.5 \left\{ \begin{array}{l} .5)946.0 \\ 5)\ 1892. \end{array} \right.$

378.4 Yards, the Anſwer.

QUESTION V.

A has 52 Dozen of Hats, worth in ready Money 2 *s.* 6 *d.* but barters at 2 *s.* 9 *d.* *per* Hat; *B* has Cotton at 10 *d.* *per* ℔. ready Money. *Query*, how much Cotton muſt *B* give for the Hats, to make his Gain in the Barter equal to *A*'s?

Firſt,

```
           d.   d.    d.   d.
Firſt, as 30 : 33 : : 10 : 11 the advanced Price of B's Cot.
                     Doz.
                      52
                      12
        11) d.       ——         d.
Then,  if 33———————624———————11
         ——           3
         3          ——
           112)1872( 16 C. 2 qrs. 24 ℔. the Cotton
                112          which B muſt give for the
               ——            Hats.
                752
                672
               —— qrs ℔.
           ℔. 80=2 : 24
```

I have not made Uſe of Decimals in this Example, it being beſt done entirely by whole Numbers.

To ſolve Queſtions in this Rule by this ſhort Method of working by the *Rule of Three Inverſe* (which I may call my own, not having ſeen it in any Author) it is proper to obſerve, that the firſt Term muſt always be the Price of 1 or Unity of the ſame Denomination with the ſecond Term, and the Anſwer or fourth Term will be of the ſame Denomination with that Quantity whoſe Value is expreſſed in the third Term. Thus in the above Example, the ſecond Term is *Hats*, and the firſt Term is the Price of 1 *Hat*; and the fourth Term (1872) is *Pounds* Weight, becauſe the third Term (11 *d.*) is the Price of 1 *Pound*.

CHAP.

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CHAP. VII.

The Uſe of DECIMALS *in* INTEREST *both* SIMPLE *and* COMPOUND; *including* Commiſſion *and* Brokerage, Rebate *or* Diſcount, Equation *of* Payments, *and purchaſing of* Freehold Eſtates.

INTEREST, is a ſmall Sum of Money paid for the Uſe of any greater Sum, according to any Rate agreed on, as 5 *l. per* 100 *l.* &c. for a Year, and it is either *Simple* or *Compound.*

SECT. I. *Of* Simple INTEREST, *with the Computation of* Commiſſion, Brokerage, *and* Inſurance.

Simple Intereſt is that which ariſes only from the *Principal* or *Sum* of *Money* lent, and therefore, tho' it be forborn any Number of Years, the *Intereſt* for each Year is the ſame, and the *Principal* continues as at firſt.

CASE I.

The *Principal, Rate* of Intereſt, and *Time* being given to find the *Intereſt.*

1. When the *Intereſt* of any Sum is required for 1 *Year,* it may be found by the *Rule of Three Direct*; thus ſuppoſe the Intereſt of 500 *l.* were required for 1 Year at 5 *l. per Cent. per An.* it would be, as 100 *l.* is to 5 *l.* (the *Rate* of tereſt) ſo is 500 *l.* (the Principal) to 25 *l.* the *Intereſt* thereof for 1 *Year.* Hence we have this *general Rule* for finding the Intereſt of any Sum for a Year; namely, to *multiply the Principal by the Rate of Intereſt,* and *divide the Product by* 100.

If the *Rate* of Intereſt is *Pounds*, and *any Part* of a *Pound*, as $3\frac{1}{4}$, $4\frac{1}{2}$, or $4\frac{3}{4}$ *per Cent.* multiply the *Principal* by the *Pounds*, and for a $\frac{1}{4}$, take a *fourth* Part of the Principal ; for $\frac{1}{2}$, take *Half* the Principal ; for $\frac{3}{4}$ take Parts compounded of $\frac{3}{4}$, which add to the Product of the Principal multiplied by the Pounds, the *Sum* divided by 100, as above directed, will be the *Intereſt* required.

Another Way of finding the Intereſt for a Year, is to take *Aliquot Parts* of 100 *l.* &c. for the given *Rate*, let the *Rate per Cent.* be what it will.

2. If the Intereſt of any Sum is required for *ſeveral Years*, multiply the Intereſt for 1 *Year* by the Number of Years given.

3. If beſides Years, the Intereſt is required for $\frac{1}{4}$, $\frac{1}{2}$, or $\frac{3}{4}$ of a Year, take Parts for the ſaid $\frac{1}{4}$, $\frac{1}{2}$, or $\frac{3}{4}$ from the Intereſt for 1 Year, and *add* them to the Intereſt for the reſt of the Time ; the *Sum* will be the *Intereſt* required.

4. If the Intereſt is required for any Number of *Months*, take Parts for the Months from the Intereſt for 1 Year.

5. If the Intereſt of any Sum be required for any Number of *Days*, multiply the Intereſt for 1 Year by the *Decimal* of the given *Days*.

6. If the Intereſt is required for *Years* and *Days*, multiply the Intereſt for 1 Year, by the *Number* of *Years* given, and the *Decimal* of the *Days*.

Note. If there be any *Shillings* and *Pence* in the Sum whoſe Intereſt is required, and the Time *not exceeding a Year*, it will be ſufficiently exact to expreſs the Decimal of them, *to two Places* only, and this may be readily done without applying to the Decimal Table of Money ; for the *Decimal* of the *Shillings* is known by taking *half* of them, as was obſerved in *Reduction* ; and as for the Pence, bring them into Farthings, and for every *ten* Farthings add 1 to the *ſecond Decimal Place* of the Shillings ; thus to find the Decimal of 15 *s* 8 *d.* to *two Decimal Places.*

To .75 the Decimal of 15 *Shillings.*
Add 3 the Number of *Tens* in 32 *Farthings.*

Sum, .78 the Decimal required. And

If inſtead of the Tens, the whole Number of Farthings were ſet down, adding 1 Farthing if above 13, and 2 if above 38, the Sum would be the Decimal to *three Places*, thus,

To .75 as before.
Add 33 the Farthings in 8 Pence, more 1,

Sum, .783 the Decimal of 15 *s.* 8 *d.* to *three Places*; and three Places of Decimals are generally ſufficient when the Intereſt is required for Years.

EXAMPLE I.

What's the ſimple Int. of 75 *l.* 13 *s.* 6 *d.* for 1 Year, at 5 *per Cent.*?

Mult. 75.67 the Principal
by 5 the *Rate* of Int.

The Prod.÷100=3.7835=3 *l.* 15 *s.* 8 *d.* the Int. required.

Or thus,

75.67
l.
5 - $\frac{1}{20}$ of 100 *l.* 3.7835 the Int. as before.

EXAMPLE II.

What's the Intereſt of 127 *l.* 10 *s.* 5 *d.* for 1 Year at 3½ *per Cent.*?

127.52 at 3½ *per Cent.*
3

382.56
½ - - - 63.76=Prin.÷2

The Sum÷100=4.4632=4 *l.* 9 *s.* 3 *d.* the Int. required.

Or thus, by taking *Aliquot Parts.*

127.52 at 3½

l.	*l.*	
2½	- 1/40 of 100	3.188 the Prin.÷ 40
1	- 1/100	1.2752 Prin.÷100

Sum, *l.* 4.4632 the Int. as before.

Beſides the two foregoing Methods, I ſhall next ſhew a ſhort Way of my own for finding the Intereſt of any Sum for a Year, if the Rate be 1½, 2½, 3½, or 4½ *per Cent.*

Firſt find the Intereſt at 5 *per Cent.* (as *in Ex.*1.) which multiply by as *many Tenths* as there are *Half-Pounds* in the given *Rate*; that is, if the *Rate* be 3½, multiply by .7; if 4½, multiply by .9, &c. the *Product* will be the *Intereſt* ſought. For Inſtance, let the Intereſt be again required of 127 *l.* 10 *s.* 5 *d.* for 1 Year at 3½ *per Cent.*

127.52
5

6.3760 the Int. at 5 *per Cent.*
.7

l. 4.46320 the Int. at 3½ *per Cent.*

EXAMPLE III.

What will Half a Year's *Dividend* on 2467 *l.* *South Sea Annuities* come to at 1¾ *per Cent.*?

This is nothing more than finding the Intereſt of 2467 *l.* for 1 *Year* at 1¾ *per Cent.*

2467
½ - - 1233.5
¼ - ½ of that 616.75

The Sum÷100=43.1725=43 *l.* 3 *s.* 5¼ *d.* the Anſw.

Or thus,

2467÷100=24.67 the Int. at 1 *per Cent.*
Multiply 7 the Quarters in $1\frac{3}{4}$

Divide by 4)172.69

43.1725 the Anſw. as before.

EXAMPLE IV.

What's the Intereſt of 257 *l.* 8 *s.* 7 *d.* for 5 Years at 4 *per Cent.*

257.429
4

10.29716 the Int. for 1 Year.
5
l. *s.* *d.*
51.48580=51 : 9 : $8\frac{1}{2}$, the Int. required.

Or thus,

Firſt, 4×5=20 the *Rate per Cent.* multiplied by the *Time*,
then multiply 257.429 the Prin.
by 20

The Product÷100=51.48580 the Int. as before.

EXAM-

EXAMPLE V.

What's the Interest of 426 *l.* 5 *s.* 9 *d.* for 6¾ Years, at 4½ *per Cent.*?

426.287 at 4½ *per Cent.*
4

1705.148
½ - 213.143

19.18291 the Int. for 1 Year.
6

115.0974 the Int. for 6 Years.
½ - - 9.5914 ditto, for ½ Year.
¼ - ½ of that 4.7957 ditto, for ¼ Year.

The Sum, 129.4845=129 *l.* 9 *s.* 8¼ *d.* the Int. for 6¾ Years.

Or thus,

Mult. 6.75 the *Time.*
by 4.5 the *Rate* of Interest.

3375
2700

The Prod. 30.375 which invert. is 573.03 Mult.
426.287 the Prin.

12788.61
127.89
29.84
2.13

The Product÷100=129.4847 the Int. as before

EXAM-

EXAMPLE VI.

What's the Intereſt of 526 *l.* 8 *s.* 10 *d.* for 8 Months, at 3¾ *per Cent.*

526.44 at 3¾ *per Cent.*
3

1579.32
½ - - 263.22
¼ - ½ of that 131.61

Sum÷100=19.7415 the Int. for 1 Year.

Mon.
6 is ½ of a Year, 9.8707 Int. for 6 Months.
2 - ⅓ of that, 3.2902 Int for 2 Months.

Sum, 13.1609 Int. for 8 Months=
13 *l.* 3 *s.* 2½ *d.* Anſwer.

Or thus,

526.44 at 3¾
l.
2½ is $\frac{1}{40}$ of 100 13.161
1¼ - ½ of that 6.5805

Sum, 19.7415 Int. for 1 Year.
8 Mult.

12)157.9320

13.161 Int. for 8 Months as before.

EXAMPLE VII.

What's the Intereſt of 2574 *l.* 12 *s.* for 90 Days, at 3¼ *per Cent.?*

2574.6 at 3¼ *per Cent.*
3
Days. *Years.*
7723.8 90=.246575
¼ - - 643.65

83.6745 the Int. ſor 1 Year.
Mult. by 575642.0 the Dec. of 90 Days inverts

16.7349
3.3470
.5020
418
59
4

Product, 20.6320=20 *l.* 12 *s.* 7¾ *d.* the Intereſt required.

Note, To find the Intereſt of a Sum for Days *without a Decimal Table of Time*, mulply the Intereſt for 1 Year by the Number of Days given, and divide the Product by 365.

The Intereſt of the above Sum for a Year, may, as well as the former Examples, be proved by taking aliquot Parts.

2574.6

10 - $\frac{1}{10}$ of 100 257.46

2 - ⅕ of 10 51.492 } Add
1 ¼ - ⅛ of 10 32.1825 }

83.6745 Int. for 1 Year as before.

EXAM-

EXAMPLE VIII.

What will 3628 *l.* 14 *s.* 9 *d.* amount to in $3\frac{1}{4}$ Years and 54 Days, at 3 *per Cent.*?

Note, The *Amount* is the Principal and Intereſt added together.

3628.737
3
108.86211 Int. for 1 Year.
Mult. 549793.3 the Time invert.
326.5863
32.6586
9.7976
.7620
980
43
5
Prod. 369.9073 Intereſt=369 *l.* 18 *s.* $1\frac{3}{4}$ *d*
Add, 3628.7375 Principal.
Sum, 3998.6448 Amount=3998 *l.* 12 *s.* $10\frac{3}{4}$ *d.*

$\frac{1}{4}$ *Year*=.25
54 *Days*=.147945
3.397945=$3\frac{1}{4}$ Years and 54 Days.

To find the Intereſt of a Sum for Years and Days *without a Decimal Table,* multiply the Intereſt for 1 Year by the Years given, and proceed with the Days as directed in the laſt Example.

Of Commiſſion *and* Brokerage.

Commiſſion is an Allowance from *Merchants* to their *Factors* or *Agents* beyond Sea, in the buying or ſelling of any Sort of Goods, and is a certain *Rate per Cent.* according to the Cuſtom of the Country where the Factor reſides.

Brokerage, is an Allowance to Perſons called *Brokers,* at a *certain Rate per Cent.* for finding Cuſtomers, and ſelling to them the Goods of other Men, whether Strangers or Natives.

The *Commiſſion* and *Brokerage,* and alſo *Inſurance* on any *Sum* is computed *in the ſame Manner as the ſimple Intereſt thereof for a Year.*

1. An

I. An *Example* in *Commiſſion.*

Suppoſe my Factor ſells Goods on my Account to the Amount of 127 *l.* 10 *s.* 5 *d.* what does his Commiſſion come to at $3\frac{1}{2}$ *per Cent.?* Anſwer, 4 *l.* 9 *s.* 3 *d.* For the *Operation*, ſee the 2d *Example* in Intereſt.

II. *Examples* in *Brokerage.*

Ex. 1. What's the Brokerage of 723 *l.* 10 *s.* 6 *d.* at $\frac{1}{8}$ *per Cent.?*

$\frac{1}{8}$)723.525

s. d.

The Quot.÷100=.9044 = 18 : 1 the Brokerage requir.

Ex. 2. What's the Brokerage of 2572 *l.* 15 *s.* at $\frac{3}{8}$ *per Cent.?*

2572.75

$\frac{2}{8}$ is $\frac{1}{4}$ 643.18

$\frac{1}{8}$ - $\frac{1}{2}$ of that 321.59

Sum,÷100=9.6477=9 *l.* 12 *s.* $11\frac{1}{2}$ *d.* the Anſwer.

Or thus,

2572.75

3

8)7718.25

The Quotient÷100=9.6478 the Anſwer as before.

III. An *Example* in *Inſurance*.

What will the Inſurance on 874 *l.* 13 *s.* 6 *d.* amount to at 13½ *per Cent.* ?

```
 874.675 at 13½               Or thus,
     13
 ─────────                      874.675
 11370.775                      ───────
½  437.337     10 is 1/10 of 100 87.4675
 ─────────       2½ - ¼ of 10    21.8668
 118.08112 =     1 - ¹  of 10     8.7467
 ─────────                      ────────
 118 l. 1 s. 7½ the Anſw.       118.0810
```

C A S E II.

The *Amount*, *Rate per Cent.* and *Time* given, to find the *Principal.*

Rule. As the *Amount* of 100 *l.* at the *Rate* and *Time* given,
Is to 100 *l.*
So is the *Amount* given
To the *Principal* required.

Example. What Principal or Sum being put to Intereſt will amount to 3998 *l.* 12 *s.* 10¾ *d.* in 3¼ Years and 54 Days, at 3 *per Cent. per Annum* ?

Or otherwiſe, thus,

What's the preſent Worth of 3998 *l.* 12 *s.* 10¾ *d.* due 3¼ Years and 54 Days hence, abating or diſcounting 3 *per Cent.* &c.

The Time 3.397945 as in *Examp.* 8. *page* 112.
Multiply by 3 the Int. of 100 *l.* for 1 Year.

Product 10.193835 the Intereſt }
Add 100. } of 100 *l.* for the Time given.
Sum 110.193835 the Amount }

Then, *l.* *l.* *l.*
if 110.193835—100—3998.6448
3998.6448 Mult.

l. *l.* *s.* *d.*
110.1938|35)399864.48(3628.737=3628 : 14 : 9 the Principal or preſent Worth required.
3305815
692829
661163
31666
22039
9627
8815
812
771
41
33
8
8

Note. The *Principal* being ſubtracted from the *Amount*, the *Remainder* is the *Diſconnt* (=369.9078 *l.*) and this is the *true Method* of finding the preſent Worth or Diſcount of all *Debts*, due at any Time hereafter.

CASE III.

The *Amount*, *Principal*, and *Time* being given, to find the *Rate* of Intereſt.

Rule, As the *Principal multiplied* by the *Time*,
Is to the *whole Intireſt*,
So is 100 *l.*
To the *Rate per Cent.*

Example. At what Rate of Intereſt *per Cent.* will 3628 *l.* 14 *s.* 9 *d.* amount to 3998 *l.* 12 *s.* 10¾ *d.* in 3¼ Years and 54 Days.

	3628.737 the Prin.	From	3998.6448 Amount
Mult.	549793.3 the Time invert.	Sub.	3628.737 Princip.
	10886.2	Rem.	369.9078 the whole Intereſt.
	1088.6		
	326.6		
	25.4		
	3.2		
	.1		

Then, as 12330.1 : 369.9078 :: 100 : 3 the *Rate per Cent.*
(*l.* over 369.9078, *l.* over 100, *l.* over 3)

100

12330.1)36990.78(3 *l.*
369903

....4

CASE IV.

The *Principal Amount*, and *Rate* of Intereſt being given, to find the *Time*.

Rule, As the *Intereſt* of the *Principal* for 1 *Year*, at the given *Rate*,
Is to one *Year*;
So is the *whole Intereſt*
To the *Time* required.

Example. In what Time will 3628 *l.* 14 *s.* 9 *d.* amount to 3998 *l.* 12 *s.* $10\frac{3}{4}$ at 3 *per Cent?*

	3628.737	From	3998.6448
Mult.	3	Sub.	3628.737

108.86211 Int. for 1 Year. The whole Int. 369.9078

$$\begin{array}{cccc} l. & Year. & l. & Year. \end{array}$$

Then, as 108.86211 : 1 :: 369.9078 : 3.398 the *Time* *Year.* required.

108.8|6211)369.9|078(3.398=$3\frac{1}{4}$ Years and 54 Days
... 3266 Sub. .25=$\frac{1}{4}$ Year.

433 .148=54 Days.
327

106
98

8
8

S E C T. II. *Of* Rebate *or* Diſcount.

Rebate or *Diſcount* is an *Abatement* of *Part* of a Sum of Money, due ſome Time hence, in conſideration of *prompt* or preſent Payment of the Remainder; and this is done at any Rate of Intereſt.

The true Way of diſcounting a Sum is by *Caſe* 2. in *Simple Intereſt*, but the Method uſed among *Bankers*, &c. in diſcounting Bills, is to find the *Intereſt* of the Sum drawn for from the Time the Bill is diſcounted to the Time when it becomes due, (including the Days of Grace) which *Intereſt* they reckon as the *Diſcount*, thereby making the

Diſcount more than it really is; for Inſtance, 'tis evident that 105 *l.* payable a Year hence, if diſcounted at 5 *per Cent.* is worth 100 *l.* preſent Money; becauſe 100 *l.* being put to Intereſt at that Rate for a Year will produce 105 *l.* ſo that the Diſcount in this Caſe muſt be 5 *l.* whereas (by the common Way) the *Intereſt* for 105 *l.* for a Year at the ſame Rate is 5 *l.* 5 *s.* which is 5 Shillings more than the *true Diſcount.*

S E C T. III. *Of* Equation *of* Payments.

Equation of Payments is when ſeveral Sums of Money, to be paid at different Times, are reduced to one mean Time for the Payment of the whole, without Loſs to *Debitor* or *Creditor.*

The *common Way* of working Queſtions in this Rule, is to multiply each Payment by its Time, and divide the Sum of all the Products by the whole Debt, the *Quotient* is reckoned the *equated Time.*

But the *correct Way* is firſt to find the *preſent Worth* of each Payment for its reſpective Time by *Caſe 2d of Simple Intereſt*; next add all the *preſent Worths* together, and call that Sum the *Principal*; then having the *Principal, Amount,* and *Rate* of Intereſt, find the *equated Time* by *Caſe* 4th *of Simple Intereſt.*

E X A M P L E.

A owes *B* 1000 *l.* whereof 200 *l.* is to be paid ready Money, 400 *l.* at 5 Months, and the reſt at 10 Months; but they agree to make one Payment of the whole; *Query,* when muſt it be paid, the *Diſcount* being at 5 *per Cent.*?

Firſt by the common Method.

l. *Mon.*
400 × 5 = 2000
400 × 10 = 4000

The Sum of the Products = 6000 which divided by 1000 the whole Debt, the Quotient is 6 *Months,* the Anſwer.

Now

6

Now for the other Method.

And firſt for the preſent Worth of each Payment by 2d *Caſe* of *Simple Intereſt.*

As 102.0833 (the Amount of 100 *l.* for 5 Months at 5 *per Cent.*) is to 100 *l.* ſo is 400 *l.* to 391.837 *l.* the preſent Worth thereof.

And as 104.1666, (the Amount of 100 *l.* for 10 Months at 5 *per Cent.*) is to 100 *l.* ſo is 400 *l.* to 384 *l.* the preſent Worth thereof.

Next add, $\left\{\begin{array}{l}200\\391.837\\384.\end{array}\right.$

975.837 the Sum of the preſent Worths or Principal.

Then by *Caſe* 4th *of ſimple Intereſt*

Mult. 975.837 the Principal.
by 5

Prod.÷100=48.79185, Int for 1 Year, or 12 Months.

From 1000.
Sub. 975.837

Remains 24.163 the Int. for the Time required.

Then it will be,

l. *M.* *l.* *Mon.*
as 48.792 : 12 :: 24.163 : 5.942=5 *Mon.* 28.26 *Days*, the Anſwer.
Mult. 30

Days 28.260

SECT.

SECT. IV. *Of* Compound INTEREST.

Compound Intereſt is that which ariſeth from the *Principal* and its *Simple Intereſt* (when due and forborn) reckoned together as a new Sum, ſo that both *Principal and Intereſt* here are always increaſing.

And although it be not lawful to let out Money at *Compound Intereſt*, yet in purchaſing of *Annuities* or *Penſions*, and *Leaſes* in *Reverſion*, it is very uſual to allow *Compound Intereſt* to the Purchaſer for *his ready Money*; and therefore it is very neceſſary to underſtand it.

CASE I.

The *Principal*, *Rate* of *Intereſt*, and *Time*, (that is any Number of entire Years) being given to find the *Intereſt*.

RULE.

1. Find the *Amount* of the given Sum by *Simple Intereſt*, for the firſt Year, which is the *Principal* for the ſecond Year: Then find the *Amount* of that *Principal* for the ſecond Year, and that is the Principal for the third Year; and ſo on for any Number of Years given.

2. Subtract the given Sum from the laſt *Amount*, and the Remainder is the *Compound Intereſt* required.

EXAM-

EXAMPLE I.

What's the Compound Intereſt of 524 *l.* 12 *s.* for 3 Years at 4 *per Cent. per Annum ?*

524.6
Mult. 4

Add 20.984 the Intereſt
524.6 the Principal
545.584 the Amount — for the 1ſt Year.
4

Add 21.82336 the Intereſt
545.584 the Prncipal
567.40736 the Amount — for the 2d Year.
4

Add 22.6963 the Intereſt
567.4073 the Principal — for the 3d Year.
From 590.1036 the Amount
Sub. 524.6 the Principal given.

Remains 65.5036 = 65 *l.* 10 *s.* 1 *d.* nearly, the *Intereſt* required.

Another Rule for finding the *Amount* of any Sum at Compound Intereſt, is continually to multiply the *Principal* by the *Amount* of 1 *l.* for a Year. And

The *Amount* of 1 *l.* for a Year is found by only dividing the Amount of 100 *l.* for a Year by 100 : thus if the *Rate* be 4 *per Cent.* the Amount of 100 *l.* for a *Year* is 104 *l.*

And 100)104. (1.04	the Am^t of 1 *l.* for a Y^r at	4 *per Cent.*
Thus alſo 100)104.5(1.045		$4\frac{1}{2}$
And 100)105. (1.05		5

To apply this to the laſt *Example.* What's the Amount of 524 *l.* 12 *s.* for 3 Years, at 4 *per Cent.*?

Mult. 524.6 the Principal.
by 1.04 the Amount of 1 *l.* for a Year as above.

20984
5246

1ſt Prod. 545.584 the Amount for 1 Year.
1.04

2182336
545584

2d Prod. 567.40736 the Amount for 2 Years.
40.1 the Multiplier invert.

567.4073
22.6963

3d Prod. 590.1036 the Amount for 3 Years as before.

EXAMPLE II.

What is the Amount of 1 *l.* for 3 Years at 4 *per Cent.*?

Mult. 1.04 } the Amount of 1 *l.* for 1 Year
by 1.04 } as before.

416
104

1.0816 the Amount of 1 *l.* for 2 Years.
1.04

43264
10816

1.124864 the Amount of 1 *l.* for 3 Years, *viz.* 1 *l.* 2 *s.* 6 *d.* nearly, the Anſw

And thus by continually Multiplying by the Amount of *l.* 1 for 1 Year, the Amount of *l.* 1 for any Number of Years may be found at any *Rate per Cent.*

CASE II.

The *Amount*, *Rate per Cent*, and *Time*, being given, to find the *Principal*.

Rule 1. As the *Amount* of *l.* 100 *Compound Intereſt*, at
the *Rate* and *Time* given,
Is to *l.* 100 :
So is the *Amount* given,
To the *Principal* required.

Or thus

Rule 2. As the *Amount* of *l.* 1 *Compound Intereſt*
at the *Rate* and *Time* given,
Is to *l.* 1,
So is the *Amount* given,
To the *Principal* required.

EXAMPLE.

What Principal muſt be put to Intereſt to Amount to *l.* 590.1036 in 3 years at 4 *per Cent per Annum*, *Compound Intereſt?*

Or in other Words,

What's the preſent Worth of *l.* 590.1036 due 3 years hence, at 4 *per Cent*, &c.

Firſt, the Amount of *l.* 1 for the Time given, is *l.* 1.124864, as *per laſt Example.*

Then (by *Rule* 2 of this *Caſe*) As 1.124864*l.* : 1*l.* :: 590.1036*l.* : 524.6*l.* = 524*l.* : 12*s.* the preſent Worth or Principal required.

CASE III.

The *Principal*, *Amount*, and *Rate* of Intereſt being given, to find the *Time*.

The General Rule for working this Caſe, is firſt to divide the *Amount* by the *Principal*, and then to divide that *Quotient* by the *Amount of l.* 1 *for a Year*, the next Quotient by *the ſame*, and ſo continually divide the Quotients by the Amount of *l.* 1 for a Year until nothing remains, that is, 'till the laſt Quotient be exactly Unity, and the *Number* of thoſe *Diviſions* will be the *Time* required.

EXAMPLE.

In what Time will *l.* 524.6 amount to *l.* 590.1036 at 4 *per Cent?*

Firſt 524.6)590 1036(= 1.124864 which is to be divided continually by 1.04 the Amount of *l.* 1 for a Year.

thus 1.04)1.124864(1.0816 firſt Diviſion.
and 1.04)1.0816(1.04 ſecond Diviſion.
again 1.04)1.04(1 third Diviſion.
Hence the Time is 3 Years.

This Method of finding the Time muſt be approved of, as being the *Converſe* of the laſt Caſe (and moreover is deduced from the 1ſt *Theorem* in *Compound Intereſt* given by Authors who treat of it Algebraically) but I think a more ready way is to multiply the Principal continually by the Amount of 1*l.* for a Year (as in the 2nd *Method* of performing *Caſe* 1) until the Product be the ſame as the given Amount, and the *Number of thoſe Operations* will be the *Time* ſought. For an *Example*, ſee the 2nd Method of working the 1ſt *Example* in *Caſe* 1. where you will find the *Principal* and alſo the *Amount* at the *third* Operation, the ſame as the *Principal* and *Amount* above given; conſequently the *Time* here required is 3 Years.

The next *Caſe* is to find the *Rate per Cent.* the *Principal*, *Amount*, and *Time* being given; but as this requires the *Extraction of Roots*, or the uſe of *Logarithms*, and is when known but of little or no Uſe, I therefore omit it.

The other *three Caſes* may alſo be much better performed by *Logarithms*, or *Tables* calculated for that Purpoſe, than otherwiſe. The moſt uſeful Queſtions likewiſe in *Annuities* at *Compound Intereſt*, are much eaſieſt anſwered by *Tables*; the Rules for ſolving them by the Pen being very intricate, the working of them laborious, and their reaſon not to be underſtood without the knowledge of *Algebra*. It muſt be acknowledged likewiſe that where diſpatch is required, Tables are very requiſite for the more expeditious finding the *Simple Intereſt* of any Sum, eſpecially for Days.

I have therefore in *Chap.* 9. inſerted Tables of *Intereſt*, both *Simple* and *Compound*, for ſolving Queſtions in *Intereſt*, *Annuities*, &c. ſo ſhall ſay nothing further here in Relation to Annuities, but conclude this Chapter with ſhewing in the two following Sections the manner of working Queſtions relating to *Freehold* or *Real Eſtates*, which if in *Reverſion* may alſo be done eaſieſt by Tables, as will appear by two or three Queſtions when I come to treat of their general Uſe.

SECT. V.

Of Purchaſing Freehold *or* Real Eſtates *at Compound Intereſt.*

All *Freehold* or *Real Eſtates* are ſuch as are bought to continue for ever, and Queſtions relating to the purchaſing of them (except in Reverſion) may be done in the moſt ſimple manner, only by the *Rule of Three*, which is a much more eaſy and familiar Method than to work by the uſual *Theorems* for performing Queſtions therein.

CASE I.

Examp. A Perſon is deſirous of laying out *l.* 780 in the Purchaſe of a Freehold Eſtate, ſo as to get 4 *per Cent.* for his Money *Compound Intereſt*. What muſt be the annual Income of ſuch an Eſtate?

l. *l.* *l.*
If 100——4——780
4
l. *s.*
the Product ÷ 100=31.20=31 : 4 the Anſwer.

'Tis obvious by this Example that the Anſwer to any Queſtion in this Caſe, is nothing more than the ſimple Intereſt of the given Sum for one Year at any propoſed *Rate per Cent.*

CASE II.

Examp. Suppoſe a Freehold Eſtate of 31*l.* 4*s.* Yearly Income were to be ſold: What is the Worth, allowing the Buyer 4 *per Cent. Compound Intereſt* for his Money?

l. *l.* *l.*
If 4——100——31.2
100
4)3120.0
780*l.* the Anſwer.

CASE III.

Examp. 1. Suppoſe *l.* 780 is given for a Freehold Eſtate, the Income being 31*l.* 4*s.* *per Annum*: What *Rate per Cent. Compound Intereſt* has the Purchaſer for his Money?

l. *l.* *l.*
If 780——31.2——100
100
780)3120.0(4 *per Cent* the Anſw.
3120

Examp. 2. Suppoſe an Eſtate of 50*l.* *per Annum* is bought for 21 years Purchaſe, how much *per Cent. Compound Intereſt* has the Purchaſer for his Money, ſuppoſing the *Taxes*, &c. to be *l.*12 *per Anuum?*

Firſt *l.* 50 × 21 = *l.* 1050 the Money given for the Eſtate.
and *l.* 50 — 12 = *l.* 38 the yearly Income
l. *l.* *l.* *l.* *l.* *s.* *d.*
Then as 1050 : 38 : : 100 : 3.69 = 3 : 12 : 4½
the *Rate per Cent.* the Anſwer.

SECT. VI.

Of Purchaſing Freehold Eſtates *in* Reverſion.

CASE I.

The *yearly Income* of a Freehold Eſtate being known, to find the *preſent Worth* of the *Reverſion* of the ſaid Eſtate after the Expiration of a certain Number of Years at any given *Rate per Cent.*

1. Find the full Value of the Eſtate as in the 2d *Caſe* of the laſt *Section.*

2. By *Caſe* 2nd *Compound Intereſt*, find what *Principal* or *Sum* will amount to the full value of the Eſtate, at the *Time* and *Rate* given.

Example.

Suppoſe the Reverſion of a Freehold Eſtate of *l.* 40 *yearly* Income to commence 3 Years hence, is to be ſold, what is it Worth, allowing the Purchaſer 4 *per Cent.* for his preſent Payment.

Firſt, Agreeable to the 2nd Caſe of the laſt *Section*, it will be

l. *l.* *l.* *l.*
As 4 : 100 : : 40 : 1000 the full Value of the Eſtate

Then by *Caſe* 2nd *Compound Intereſt* (as *l.* 1.124864 is the Amount of *l.*1 for the Time and Rate given) it will be

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l. *l.* *l.* *l.* *l.* *s.* *d.*
As 1.124864 : 1 : : 1000 : 888.996 = 888 : 19 : 11
the preſent Worth of the Reverſion. The Anſwer.

CASE II.

The *Sum* given for the Reverſion of a Freehold Eſtate, to commence after a certain Number of Years, being known, to find the *yearly Income*, allowing the Purchaſer ſo much *per Cent.* for his Money.

1. Find the *Amount* of the *Sum* given, to the *Time* from which the Reverſion is to Commence, by *Caſe* 1. *of Compound Intereſt.*
2. Find the *yearly Income* which that *Amount* will purchaſe, as in *Caſe* 1 of the laſt *Section.*

Example.

Suppoſe the Reverſion of a Freehold Eſtate to commence 3 Years hence is ſold for 889*l.* what muſt the yearly Income be, for the Purchaſer to get 4 *per Cent.* for his Money?

Firſt for the Amount of *l.* 889 for 3 years at 4 *per Cent.* by *Caſe* 1 *Compound Intereſt.*

$$889 \times 1.04 = 924.56$$
$$924.56 \times 1.04 = 961.5424$$
$$961.5424 \times 1.04 = 1000.004096 \text{ the Amount.}$$

Here the Amount of the given Sum for 3 years, (rejecting the Decimals) is found to be *l.* 1000. And the yearly Income which *l.* 1000 will purchaſe at 4 *per Cent.* is *l.* 40 (agreeable to *Caſe* 1 of the laſt *Section)* which anſwers the Queſtion.

CHAP.

CHAP. VIII.

The Uſe of DECIMALS *in the* Computation *of* Exchanges, *&c.*

SECT. I.

Of EXCHANGE *in general.*

Exchange is the giving the *Money* of one Country for *that* of another, by Means of a Bill, Inſtrument, or Writing, called a *Bill of Exchange.*

Money, is either *Real* or *Imaginary.*

Real Money is any Species of current *Coin* paſſing at a certain Price by the Law of any Country, as a *Guinea*, a *Crown*, a *Shilling*, &c.

Imaginary Money (which is generally made uſe of in keeping Accounts) is a certain Quantity of Species, as a *Pound*, a *Mark*, an *Angel*, a *Noble*, &c.

The *Par of Exchange* is the *intrinſick Value* that the Money of one Country bears to that of another.

The *Courſe of Exchange*, is the *Current Price* of *Exchange*, always unſettled, being ſometimes *above*, and ſometimes *below* the *Par*, according to the various Circumſtances and Accidents of *Trade* and *Nations.*

The Form of Bills of Exchange.

l. 500 at 36 : 2 *Flem. per l. Sterl.* London, 1 January 1757.

At three Days ſight pay this my only Bill of Exchange to Mr. A. B. or Order, five hundred Pounds Sterling in Bank Money *Exchange*, at thirty ſix Schillings and two Grotes *Flem. per l. Sterling*, Value received of Mr. C. D. as *per* Advice from

Your humble Servant,

To Mr. G. H. E. F.

Merchant in *Amſterdam.*

W. *l.* *s.* *d.*
London 1ſt of January 1757. 653 : 2 : 17 : 4

At *Uſance* pay this my *firſt* of Exchange to Mr. A. B. or Order, ſix hundred fifty three Crowns, two Livres, ſeventeen Sous, and four Deniers of the Current Money of France unto us this Day known, Value received of Mr. C. D. as *per* Advice from

Your humble Servant,
To Mr. G. H.
E. F.
Merchant in *Paris.*

W. *l.* *s.* *d.*
653 : 2 : 17 : 4 London 1ſt. of January, 1757.

At *Uſance* pay this my *ſecond* of Exchange (my *firſt* not being paid) to Mr. A. B. or Order, ſix hundred fifty three Crowns, two Livres, ſeventeen Sous, and four Deniers, of the Current Money of France, unto us this Day known, Value received of Mr. C. D. as *per* Advice from

To Mr. G. H.
Your humble Servant,
Merchant in *Paris.*
E. F.

Note, The Buyer who firſt purchaſes the Bill of the *Drawer*, is called the *Remitter.*

If a Bill is refuſed Acceptance, or not paid when it becomes Due, the Bearer is immediately to get it proteſted, and ſend it back in proteſt to the Drawer or Remitter, on Neglect of which, he himſelf is anſwerable for the Money.

Bills Drawn at *Uſance* differ their times of Payment according to their Country; but in *England*, *France*, and ſeveral other Places, by *Uſance*, is meant *thirty days* from the Date of the Bill, excluſive of the *Days of Grace.*

There is commonly allowed ½ *per Cent* for negotiating Bills, that is, when Money is *remitted* by means of a Bill of Exchange to a Correſpondent in one Country, with Orders for him to *remit* the ſaid Sum to another; or when Orders are ſent to a Correſpondent to *draw* upon one Place, and remit the Money to another; there is an Allowance of about ½ *per Cent* (called *Commiſſion*) for ſuch Negotiation.

In all Countries where there are Banks, except here, the *Exchange* or *Bank Money* is conſiderably higher than the *Current Money*; the *Bank Money* being always compoſed of the fineſt and beſt Species of Gold or Silver Coins, ſuch as the *Pars* have been fixed upon between Nations: And this Money being not always plenty enough to anſwer the end of Bills, the Merchants abroad are therefore many times obliged to take *Current Money* for their Bills of Exchange: But then they are allowed ſo much more *per Cent.* in Payment, according to what the *Exchange Money* is worth more than the *Caſh* or *Current money*, and this Difference, which is uſually called *Agio*, amounts to between 4 and 5 *per Cent.* nay ſometimes at *Hamburgh* to 16 or 17 *per Cent.*

The requiſites to be known in Exchanges are,

1. The Money every Country keeps their Accounts in.

2. The Money in which we Exchange with them; wherein is to be underſtood, what Places give the *certain* or fixed *Price*, and what give the *uncertain Price*: As for Inſtance, *London* always gives the (Pound Sterling) *certain* when it Exchanges with *Holland*, *Flanders*, and *Hamburgh*; but when *it* Exchanges with *France*, *Portugal*, *Spain*, &c. *London* always gives an uncertain Number of Pence, which is the *uncertain* Price, and they give the *Certain*; as *France* gives the *Ecu* or *Crown*, *Portugal* the *Milree*, and *Spain* the *Piaſtre*; and ſo conſequently where one Country gives the *Certain*, the other correſponding Country gives the *Uncertain*.

SECT. II.

Of Great Britain.

Accounts are kept in *London*, and throughout the Britiſh Dominions, in Pounds, Shillings, Pence, and Farthings; reckoning 4 Farthings to a Penny, 12 Pence to a Shilling, and 20 Shillings to a Pound.

The *Coins* of Great Britain are

In Copper, a Farthing, and a Halfpenny valued at two Farthings.

In Silver, of eleven Ounces, and two penny weight Fine, with eighteen penny weight of Allay, called Sterling Silver.

A Piece valued at
- 6 Pence, or 12 halfpence, or 24 Farthings.
- 12 Pence, called a Shilling.
- 2*s*. 6*d*. called half-Crown.
- 5 Shillings, called a Crown Piece.

There are likewiſe ſilver Pence, two Pences, three Pences, and Groat Pieces, but they are ſeldom to be met with.

The Gold *Coins* (of twenty two *Carats* fine, with two *Carats* of Allay, called Standard Gold) are

A Guinea, valued at 21 Shillings. And
Half a Guinea, valued at 10*s*. 6*d*.

Note, A *Carat* is $\frac{1}{24}$ part of a Pound, an Ounce, or any other Weight.

The Manner of computing the Exchanges between *London* and *Foreign Countries* will be ſhewn in the following Sections: In this I ſhall only add the ſubſequent Rules for *London* to *remit* or *draw* by, with an Obſervation on the *Par* of Exchange, *&c.*

Rules for London to Remit or Draw by.

You are to obſerve, that to *Spain*, *France*, *Portugal*, or any other Place, where they Exchange *by the Piece*, ſuppoſe at 38 Pence *per* Piaſtre; 30½*d*. *per* Crown, or at 5 *s*. 3 *d*. *per* Milree; the *lower* the Price is, the better it is for *London* to *remit*, becauſe if I deliver *l*. 100 Sterling, for a Bill upon *France*, *Spain*, or *Portugal*, I can have more Piaſtres at 3*s*. 2 *d*. than at 3 *s*. 5 *d*. *per* Piaſtre, or more Crowns at 30*d*. than at 32½*d*. *per* Crown for the ſaid *l*. 100. And the *contrary* is to be obſerved in *Drawing*.

But to *Holland*, *Hamburgh*, and *Flanders*, where the Exchange iſ at ſo much *per l. Sterling*, the *higher* the Price, the more it is for the advantage of *London* to remit to thoſe Places: for every one muſt know it is better to get 35*s.* 6*d.* Dutch Money for 20 Shillings Sterling, than 34*s.* 6*d.* for the ſame: and the *contrary* is to be obſerved in Drawing.

And ſo for *Ireland*, and the *Weſt Indies*, where they Exchange by the *l.* 100, the *higher* the Courſe between *London* and thoſe Places are, the better it is for London to remit, that is to ſay, it is better to pay *l.* 100 in *London*, and receive *l.* 112 in *Ireland*, than to pay the ſame Sum in *London*, and to receive but 105 in *Ireland*; the ſame may be ſaid of the *Weſt Indies*.

And it is to be obſerved, that when the *Courſe* of *Exchange* is *above* the *Par* at thoſe Places where they exchange by the *l. Sterling*, as at *Holland*, &c. and *below Par* where they exchange by the *Piece*, as at *France*, &c. it is a general Indication that our *Trade* is *proſperous*, and the *Nation* on the *gainful* Side: On the contrary, if it is *below Par*, where they exchange by the *l. Sterl.* and *above Par* where they exchange by the Piece, the Trade is *bad*, and the Nation *Loſer*.

N. B. The *Prices* of the Exchanges at *London*, *Amſterdam*, and *Hamburgh*, have a very great Influence upon all the reſt of *Europe*.

SECT. III. *Of* Ireland, *or* Dublin.

Accounts are kept here in Pounds, Shillings and Pence, *Iriſh* Money, which is imaginary; they reckon as in *London* 12 Pence to a Shilling, and 20 Shillings to a Pound.

The *Par* of a *Pound Iriſh* is 18 *s.* 5½ *d. Sterling*; ſo that the *Par* of 108 *l.* $7\frac{19}{443}$ *s. Iriſh* is 100 *l. Sterling*.

The *Coins* current among them are ſome *Engliſh*, ſome *Spaniſh*, ſome *French*, ſome *Portugueſe*, and ſome *Dutch*, &c.

The *Exchange* between *London* and *Dublin* is from 6 to 12 *per Cent.* Difference between the Money of *London* and that of *Dublin*; that is, ſuppoſing the *Rate* of Exchange to be at 10 *per Cent.* then 100 *l.* in *London* will be 110 *l.* at *Dublin*.

Examples of Exchanges.

London remits to *Ireland* 273 *l.* 18 *s.* 6 *d.* *Sterling*, Exchange at $8\frac{3}{4}$ *per Cent.* what muſt be received in *Ireland* for this Remittance?

l. *l.* *l.*
100——108$\frac{3}{4}$——273.925
108$\frac{3}{4}$

2191.400
27392.5
$\frac{1}{2}$ - 136.962
$\frac{1}{4}$ - 68.481

The Product÷100=297.89343=297 *l.* 17 *s.* 10$\frac{1}{2}$*d*
—— *Iriſh* Money, the Anſwer.

Ireland remits to *London* 297 *l.* 17 *s.* 10$\frac{1}{2}$ *d.* *Iriſh*, how much muſt be received in *London* for this Remittance, the Exchange at $8\frac{3}{4}$ *per Cent.*?

l. *l.* *l.*
108.75——100——297.8934
l.
108.75)29789.3|4(273.925 =273 *l.* 18 *s.* 6 *d.*
.... 21750 *Sterl.* the Anſwer.

80393
76125

4268
3263

1005
979

26
21

5
5

.

Or thus,

```
 l.   s.         l.         l.   s.   d.
108 : 15 ——— 100 ——— 297 : 17 : 10½
  20                      20
———                      ———
2175                2175)595788.(273.925 the Anſw.
———                   ... 4350            as before.
                          ————
                          16078
                          15225
                          ————
                           8538
                           6525
                           ————
                            2013
                            1958
                            ————
                              55
                              44
                             ———
                              11
                              11
                             ———
```

Note, the 88 at the Right-hand of the Dividend is (.88) the 10½*d.* reduced to the *Decimal* of a *Shilling*, but the third Tern 5957.88 being multiplied by 100, moves the Decimal Point to the Right-hand. The ſame Thing is to be obſerved in ſeveral Examples in the following Sections, where the middle Term is 100.

SECT. IV. *Of* America *and the* Weſt-Indies.

In all the *Britiſh* Dominions in *America* and the *Weſt-Indies* they keep their Accounts in Pounds, Shillings and Pence, as we do in *London*, but they call their Money *Currency*.

In the *Britiſh* Iſlands in the *Weſt-Indies* they have ſo great Plenty of foreign *Coins*, that 7 Pounds of their *Currency* is valued at 5 Pounds *Sterl.* But in moſt of the *Britiſh* Settlements upon the *Continent* they have very few *Coins* of any Sort circulating among them, ſo that they are obliged to give Notes of Hand, (which they call *Paper Money*) for very ſmall Sums, and this Paper Money being ſubject to many Caſualties, it cauſes a great Undervaluement of their *Currency*, it being ſometimes at 6, 7, or 800 *per Cent.* Diſcount for *Sterling*. (or for good Silver or Gold.)

The Method of bringing *Sterling* Money into their *Currency*, and the contrary, is exactly ſimilar to the Examples in the laſt Section.

SECT. V. *Of* Amſterdam *and* Rotterdam.

In *Amſterdam* and *Rotterdam*, which are the principal Places of Exchange in *Holland*, they keep their Accounts in Guilders, Stivers, and Penningens, reckoning 16 Penningens to a Stiver, and 20 Stivers to a Guilder, which are ſometimes called Florins.

They alſo reckon 8 Penningens to a Grote, or Penny *Flemiſh*, 2 Grotes to a Stiver; 12 Grotes or 6 Stivers to a Schilling; and 20 Schillings to one Pound *Flemiſh*, which is juſt the Value of 6 Guilders.

Of this Money, ſome is *real*, and ſome *imaginary*.

The *real* Money is the Stivers, Guilders, and Schillings.

The *imaginary* is the Penningens, Grotes, and Pounds.

Between *Holland* and *London* 12 Guilders is the *Par* of a Guinea *Sterling*, and 11 Guilders $8\frac{4}{7}$ Stivers, or $38\frac{2}{21}$ Schillings is the *Par* of one Pound *Sterling*, according to which their *Coins* are worth as follows, *viz.*

			Sterling.	
	Guil.	*Stiv.*	*s.*	*d.*
A Dute, -	—	— $\frac{1}{8}$	—	— $\frac{21}{160}$
A Stiver, -	—	1	—	$1\frac{1}{20}$
A Schilling, -	—	6	—	$6\frac{3}{10}$
A Guilder or Florin,	1	—	1	9
A Zealand Dollar,	1	10	2	$7\frac{1}{2}$
A Rix Dollar, -	2	10	4	$4\frac{1}{4}$
A Dry Guilder, -	3	—	5	3
A Ducat, -	5	5	9	$2\frac{1}{4}$

London exchanges with *Amſterdam* in Schillings, and Grotes Flemiſh, being a Mixture of the real and imaginary Money.

The *Courſe of Exchange* is between 30 and 40 Schillings *Flem. per l. Sterling.*

Before I proceed to the Examples I ſhall firſt give the following DECIMAL TABLES *for turning Stivers and Penningens into the Decimal of a Guilder, and the contrary.* Decimal Tables in the Computation of Exchanges being of equal Service with thoſe of *Weights* and *Meaſures*, &c. in other Computations, and are uſed in the ſame Manner.

One *Guilder* the Integer.

TABLE I.

Stiver.	*D.Parts.*	*Stiver.*	*D.Parts.*
1	.05	11	.55
2	.1	12	.6
3	.15	13	.65
4	.2	14	.7
5	.25	15	.75
6	.3	16	.8
7	.35	17	.85
8	.4	18	.9
9	.45	19	.95
10	.5		

TABLE II.

Phen.	*D. Parts.*	*Phen.*	*D. Parts.*
1	.0031	9	.0281
2	.0062	10	.0312
3	.0094	11	.0344
4	.0125	12	.0375
5	.0156	13	.0406
6	.0187	14	.0437
7	.0219	15	.0469
8	.0250		

Examples of Exchanges.

London remits to *Holland* 478 *l.* 14 *s.* 6 *d. Sterling*, the Exchange at 35 Schillings 6½ Grotes *Flem. Banco* per *L. Sterling*; what muſt be paid in *Holland* for this Remittance?

478.725 at 1 *l.* 15 *s.* 6½ *Flem.*
10 *s.* - $\frac{1}{2}$ 239.3625
5 - $\frac{1}{2}$ 119.6813
6 *d.* - $\frac{1}{10}$ 11.9681
$\frac{1}{2}$ - $\frac{1}{12}$ .9973

850.7342 *l. Flem.*
Mult. by 6 the Guilders in a *l.*

5104.4052 Guilders.
Subtract .4 = 8 Stiv. }
Remains .0052 = 2 Penn. nearly } *per Tables.*

Hence the Anſwer is 5104 *Guil.* 8 *Stiv.* 2 *Penn.*

Or thus,

478.725 at 35 *Sch.* 6½ *Gr. Flem.*
Multiply 35

2393.625
gr. 14361.75
6 - $\frac{1}{2}$ 239.362
$\frac{1}{2}$ - $\frac{1}{12}$ 19.947

17014.684 Schill.
Mult. .3

5104.4052 Guilders as before.

Note. Schillings are brought into Guilders by multiplying by 6 and dividing by 20; or, which is the ſame, by multiplying by 3 and dividing by 10, which is no more than multiplying by .3, as in the Work.

Holland remits to *London* 5104 *Guild.* 8 *Stiv.* and 2 *Pen.* at 35 *s.* 6½ *d. Flem. Banco*, per *l. Sterling*, what will this Remittance amount to in *London*?

```
         Sch. gr.       l.        Guil. St. Pen.
         35 : 6½ ——— 1 ——— 5104 : 8 : 2
Mult.    12                       40
         ————                     ————————
Grotes   426½             426.5)204176.25(478.725=
                                17060        478l. 14s. 6d.
                                —————        the Anſwer.
                                33576
                                29855
                                —————
                                 37212
                                 34120
                                 —————
                                  3092
                                  2986
                                  ————
                                   106
                                    85
                                   ———
                                    21
                                    21
                                   ———
```

Note. In multiplying by 40 (the Number of Grotes in a Guilder) 16 Grotes are taken in for the 8 Stivers, and the Decimal .25 is the 2 Penningens turned into the Decimal of a Grote. This Method of ordering with the firſt and third Numbers is often ſhorter than working *altogether* decimally, and therefore I have frequently uſed it in this Chapter.

It was obſerved in the 1ſt *Section* of this *Chap.* that in all foreign Countries, where there are Banks, the *Bank* Money is conſiderably higher than the *Current* Money; the Difference being called *Agio*.

The Bank Money of *Holland* is brought into current Money, and the current Money into Bank Money, as in the two following Examples.

Example 1. Reduce 3250 *Guild.* 10 *Stiv.* and 8 *Pen.* *Bank* Money into *Current* Money, the *Agio* $4\frac{5}{8}$ *per Cent.*

10 *Stiv.*=.5
8 *Pen.*=.025

Guil. Cur.
Guild. Bco. 100——$104\frac{5}{8}$——3250.525 *Guild. Bco.*
Multiply by $104\frac{5}{8}$

13002.100
325052.5
$\frac{4}{8} - \frac{1}{2}$ 1625.26
$\frac{1}{8} = \frac{1}{4}$ 406.31

Guil. Stiv. Pen.
The Product÷100=3400.8617=3400 : 17 : 4 the
Sub. .85 =17 *Stiv.* Anſ.

Remains .0117=4 *Pen.* nearly.

Example 2. How much *Bank* Money will 3400 *Guild.* 17 *St.* 4 *Pen.* *Current* Money come to, when the *Agio* is at $4\frac{5}{8}$ *per Cent.*?

Guil. Cur. *Bco.* *Guil. Cur.*
$104\frac{5}{8}$——100 —— 3400.862
8 8

837 837)2720689.6(3250.525 *Guil. Bco.*
2511 =3250 *Guil.* 10 *Sti.* 8 *Pen.* the Anſwer.

2096
1674

4228
4185

4396
4185

2110
1674

4360
4185

In like Manner with the foregoing Examples, the Bank Money of any Country may be reduced to current Money, and Current Money to Bank Money.

A Merchant in *Amſterdam* owes one in *London* 2154 *Guil.* 12 *Stiv.* 4 *Pen.* *Current* Money, how much *Sterling* muſt the Merchant in *London* receive for his Draught, when the Exchange is at 35 *s.* 3½ *d.* *Flem. Bco.* per *l. Ster.* *Agio* 4½ *per Cent.*?

```
                         12 Stiv.=.6
                          4 Pen.=.0125
Guil. Cur.     Bco.      ─────────────
   104.5────100────2154.6125 Cur.
                      ─────────────

104.5)215461.250(2061.83 Guil. Bco.
      2090
      ────          s.  d.   l.  Guild.Bco.
       6461        35 : 3½──1──2061.83
       6270        12              40
       ────        ────       ────────  l.
        1912      423½=423.5)82473.20(194.743
        1045      Grotes. . .  4235
        ────                   ─────
        8675                   40123
        8360                   38115
        ────                   ─────
         3150                   20082
         3135                   16940
         ────                   ─────
           15                    3142
                                 2965
                                 ────
                                  177
The Anſw. is, 194 l. 14s. 10d.    169
                                  ───
                                    8
                                    8
                                   ──
```

A Merchant in *London* draws on *Amſterdam* for 194 *l.* 14 *s.* 10 *d.* *Sterling* Exchange, at 35 *s.* 3$\frac{1}{2}$ *d.* *Flem.* *Bco.* per *l.* *Sterl.* how much muſt be paid there *Current* Money, the *Agio* 4$\frac{1}{2}$ *per Cent.*?

l. *s.* *d.*
194.742 at 35 : 3$\frac{1}{2}$
Mult. 35
973.710
d. 5842.26
3 - $\frac{1}{4}$ 48.685
$\frac{1}{2}$ - $\frac{1}{8}$ 8.114
6872.769 Schillings.
Mult. .3
2061.8307 *Guil. Bco.*

Guild. Bco.
2061.8307 at 4$\frac{1}{2}$ *Ag.*
Mult. 104$\frac{1}{2}$
8247.3228
206183.07
$\frac{1}{2}$ - 1030.9153
Prod. ÷ 100 = 2154.6130
Sub. .6 = 12 *Stiv.*
Rem. .013 = 4 *Pen.* nearly.

The Anſwer is 2154 *Guild.* 12 *Stiv.* 4 *Pen.* *Cur.* Money.

SECT. VI. *Of* Antwerp.

Next to *Amſterdam* and *Rotterdam*, *Antwerp* is the principal Place of Exchange in the *Netherlands*.

Accounts are kept here in Pounds, Schillings, and Grotes or Pence *Flemiſh*, reckoning, as in *Amſterdam*, 12 Grotes to a Schilling, and 20 Schillings to a Pound.

The Schillings only are *real*. The *Coins* current in *Antwerp* are much the ſame as in *Holland*.

The Manner of exchanging with *London* and the *Par* of Exchange is the ſame as at *Amſterdam*; the Exchange being in Schillings and Grotes; and 38 $\frac{2}{11}$ Schillings the *Par* of 1 *l.* *Sterling*.

The *Courſe of Exchange* is alſo between 30 and 40 Schillings *Flem.* per *l.* *Sterling*.

Exam-

Examples of Exchanges.

How much Money of *Antwerp* will 1011 *l.* 18 *s.* $4\frac{1}{4}$ *d.* *Sterling* come to, when the Exchange is at 36 *s.* 6 *d.* *Flem.* per *l.* *Sterling.*

	l.	*s.* *d.*
	1011.9177	at 36 : 6 *Flem.*
d.	809.5342	= 1011.9177 × .8 the Dec. of
6 - $\frac{1}{40}$	25.2979	16 *s.*
Sum,	1846.750	= 1846 *l.* 15 *s.* *Flem.* the Anſ.

The ſame by common Arithmetic.

s.		*l.*	*s.*	*d.*	*l.* *s.* *d.*
		1011	18	$4\frac{1}{4}$	at 1 : 16 : 6
10 -	$\frac{1}{2}$	505	19	$2\frac{1}{4}$	
4 -	$\frac{1}{5}$	202	7	8	
2 : 6 -	$\frac{1}{4}$	126	9	$9\frac{1}{2}$	
		1846	15	—	*Flem.*

How much *Sterling* Money will 1846 *l.* 15 *s.* *Flem.* come to, when the Exchange is at 36 *s.* 6 *d.* *Flem.* per *l.* *Sterling?*

s. *d.*	*l.*	*l.* *s.*
36 : 6 ——	1 ——	1846 : 15
2		40
		l.
73		73)73870(1011.9178 =
		1011 : 18 : $4\frac{1}{4}$ *Ster.*

SECT.

SECT. VII.

A great many of the principal Towns and Cities in the *Netherlands* exchange among themſelves at ſo much *per Cent.* more or leſs, according as the Demands and Neceſſities are, which does not uſually riſe to above $\frac{1}{8}$, $\frac{1}{4}$, $\frac{3}{8}$, or $\frac{1}{2}$ *per Cent.* except upon ſome extraordinary Occaſions; notwithſtanding, when they do remit to, or draw upon *England*, or any foreign Place, by the Way of *Amſterdam*, the Advance is commonly 1 or $1\frac{1}{2}$ *per Cent.* which is moſtly owing to the Scarcity or Want of Bills for *England*, or upon ſuch-like Occaſions.

Examples of Flanders *Exchanges*.

Flanders draws upon *Holland* for 473 *l.* 18 *s.* 6 *d.* Exchange Money, at $1\frac{1}{2}$ *per Cent.* Advance, or in Favor of *Amſterdam*, to know what this Draught will amount to in *Amſterdam?*

l. Fland. *l. Amſt.* *l. Fland.*
101.5——100——473.925
101.5)47392.5(466.921 *l. Amſter.*
. . . 4060 Mult. 6

6792 2801.526 *Guilders.*
6090 Sub. .5 =10 *Stiv.*

7025 Rem. .026= 8 *Pen.* nearly.
6090

935
914

21
20

1
1

.

Anſwer, 2801 *Guild.* 10 *Stiv.* and 8 *Pen.* muſt be paid in *Amſterdam.*

Holland.

Guild. Stiv. Phen.
Holland remits to *Flanders* 2801 : 10 : 8 to receive in *Flanders* for every 100 *Guilders*, or 100*l.* *Flemiſh*, 101½ how much will this Remittance amount to in *Flanders*.

6)2801.525 *Guild.*
l. *l.*
100———1½——— 466.921 *l. Flem.*
½ - 233.46

The Sum÷100=7.00381 the Advance
Add, 466.921
l. *s.* *d.*
Anſwer, 473.9248=473 : 18 : 6 muſt be received in *Flanders*.

This Queſtion might alſo be done in the ſame manner as the Example in the 5th *Section* for bringing Bank Money into Current Money, making 101½ the middle Term.

SECT. VIII. *Of* Hamburgh.

Hamburgh is the principal Place of Exchange in all *Germany*.

Accounts are kept here in the Bank, and by the greater Part of the People in Marks, Shillings Lubs, and Phennings.

And ſome keep them (as they do in Antwerp) in Pounds, Schillings, and Grotes Flemiſh.

Of the above Money, only the Phennings, and Shillings Lubs are *Real*.

They reckon 12 Phennings to one Shilling Lubs, and 16 Lubiſh Shillings to a Mark.

They alſo reckon 6 Phennings, or ½ Shilling Lubs, to a Grote Flemiſh; 12 Grotes Flemiſh, or 6 Shillings Lubs, to one Schilling Flemiſh; and 20 Schillings Flemiſh, or 7½ Mark Lubs, to one Pound Flemiſh. And 3 Mark Lubs, or 8 Schillings Flemiſh, make a Rixdollar.

Between *Hamburgh* and *London*, a Mark or 16 Lubiſh Shillings is the *Par* of 1*s.* 6*d.* Sterling; ſo that 13 Marks 5 Shillings, and 4 Phennings Lubs, or 35 Schillings 6⅔

Grotes Flemiſh, is the *Par* of 1*l.* Sterling. Hence the Value of their *Coins* is as follows, *viz.*

A Tryling $\frac{1}{4}$ of a Phenning = $\frac{3}{128}$ } of a Penny Sterl.
A Sexling $\frac{1}{2}$ of a Phenning = $\frac{3}{64}$ } of a Penny Sterl.
A Phenning $\frac{1}{2}$ of a Shil. Lubs = $\frac{3}{32}$ } of a Penny Sterl.
A Shilling Lubs — — = $1\frac{1}{8}$ Penny.

A Dollar at 2 Marks, or 3 Shillings Sterling.
A Rixdollar at 3 Marks or 4*s.* 6*d.* Sterling.
A Ducat at $6\frac{1}{4}$ Marks, or 9*s.* $4\frac{1}{2}$*d.* Sterling.

The *Exchange* between *London* and *Hamburgh*, is in Schillings and Grotes Flemiſh, which are only Imaginary.

The *Courſe of Exchange* is from 32 to 38 Schillings Flemiſh, *per l.* Sterling.

TABLES for turning Lubiſh Shillings, *and* Phennings *into the* Decimal *of a* Mark, *and the contrary.*

TABLE 1.

Sh.	*D. P.*
4	.25
8	·5
12	·75

TABLE 2 One Mark the *Integer*.

Phen.	*D. P.*	*S. P.*	*D. P.*	*S P.*	*D. P.*	*S. P.*	*D. P.*
1	.0052	1 : 1	.0677	2 : 1	.1302	3 : 1	.1927
2	.0104	1 : 2	.0729	2 : 2	.1354	3 : 2	.1979
3	.0156	1 : 3	.0781	2 : 3	.1406	3 : 3	.2031
4	.0208	1 : 4	.0833	2 : 4	.1458	3 : 4	.2083
5	.0260	1 : 5	.0885	2 : 5	.1510	3 : 5	.2135
6	.0312	1 : 6	.0937	2 : 6	.1562	2 : 6	.2187
7	.0365	1 : 7	.0990	2 : 7	.1615	3 : 7	.2240
8	.0417	1 : 8	.1042	2 : 8	.1667	3 : 8	.2292
9	.0469	1 : 9	.1094	2 : 9	.1719	3 : 9	.2344
10	.0521	1 : 10	.1146	2 : 10	.1771	3 : 10	.2396
11	.0573	1 : 11	.1198	2 : 11	.1823	3 : 11	.2448
1 Shil.	.0625	2 :	.1250	3 :	.1875		

Examples of Exchanges.

If *London* draws on *Hamburgh* for 395*l.* 18*s.* 10*d.* Sterl. Exchange at 35*s.* 2*d.* Flem. *Bco. per l.* Sterl. how much muſt be paid at *Hamburgh?*

l. *s.* *d.* Marks Sh.
395.9416 —— at 35 : 2 = 13 : 3
mult — 13 6

Sh. 5147.2408 16)211 : -
2 - $\frac{1}{8}$ of a Mark 49.4927
1 - $\frac{1}{2}$ of that — 24.7463 13 : 3

5221.4798 Marks
Sub. —— .25 = 4 Shill. } *per Tables.*
Remains .2298 = 3 Shill. 8 Phen. }

Hence the Anſwer is 5221 Marks, 7 Shill. 8 Phen.

Or thus,

l. *Sch.* *gr.*
395.9416 - - at 35 : 2
mult. — 105$\frac{1}{2}$ 3

1979.7080 105 : 6
39594.16
$\frac{1}{2}$ — 197.9708

8)41771.8388

5221.4798 Marks as before

Schillings Flem. being brought into Marks by multiplying by 6, and dividing by 16. Hence the reaſon of multiplying here by 3, and dividing by 8.

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Marks Sh. Ph.

If *Hamburgh* draws on *London* for 5221 : 7 : 8 Lubs, when the Exchange is at 35*s.* 2*d.* Flem. *Bco. per l.* Ster. How much Sterling will that come to?

Sch : *d.* — *l.* — *M.* *S.* *P.*
35 : 2 —— 1 —— 5221 : 7 : 8
6 16
Lubiſh Sh. 211 ; - *l.*
211)83543.66(395.9415 =
633 *l.* *s.* *d.*
395 : 18 : 10
2024 Ster. the Anſ.
1899
1253
1055
1986
&c.

The .66 in the Dividend is the 8 Phennings turned into the Decimal of a Shilling Lubs by dividing it by 12.

Hamburgh is indebted to *London* for the *Nett Proceeds* of a Parcel of Eaſt India Goods 7465 Marks, 14 Shill. 6 Phen. *Current* Money; I would know how much Sterling the ſaid Sum will amount to, the Exchange at 35*s.* 3*d.* Flem. *Bco. per l.* Sterling, and the *Agio* at 15⅜ *per Cent.*

Sh. *Ph.*
12 : -- = .75
2 : 6 = .1562
Marks M.*Bco.*
firſt if 115⅜ — 100 —— 7465.9062 Marks
8 8
Marks *Bco.*
923 923)5972724.96(6470.991

s. *d.* *l.* Marks *Bco.*
next if 35 : 3——1——6470.991
6 16
l.
211 : 6=211.5)103535.856(489.5312 =
489*l.* 10*s.* 7½*d.* the Anſwer.

London remits to *Hamburgh* 489*l.* 10*s.* 7½*d.* Sterling, Exchange at 35*s.* 3*d.* Flem. *per l.* Sterling. How much *Current* Money muſt be paid at *Hamburgh* for this Remittance, the *Agio* at 15⅜ *per Cent.*

l. *s.* *d.*
489.5312 —— at 35 : 3
mult. 105 3
2447.6560 105 : 9
d. 48953.12
6 — ½ 244.7656
3 — ½ 122.3828
8)51767.9244
6470.990 Marks *Bco.* at 15⅜ *Agio.*
mult. 115⅜
32354.950
711808.90
$\frac{2}{8}$ — ¼ 1617.747
⅛ — ½ 808.873
Prod.÷100=7465.90470 Marks *Current.*
Sub. .75 = 12 Sh.
Remains .1547 = 2 Sh. 6 Ph. nearly.

Hence the Anſwer is 7465 Marks, 14 Shill. 6 Phen. *Current* Money.

SECT.

SECT. IX. *Of* Paris, Bourdeaux, *&c.*

Paris and *Bourdeaux* are the principal Places of Exchange in *France.*

Accounts are kept throughout the *French* Dominions in Livres, Sols, and Deniers, reckoning 12 Deniers one Sol, and 20 Sols one Livre.

Their Livres are imaginary, and they reckon 3 to an *Ecu* or *Crown*, the *Par* of which is 29¼ *Pence Sterling.* Hence the Value of their *Coins* is as follows, *viz.*

		Sterling *s.*	*d.*
A Denier	— — —	- :	- $\frac{13}{320}$
A Liard	— = 3 Deniers —	- :	- $\frac{39}{320}$
A Dardene	— = 2 Liards —	- :	- $\frac{39}{160}$
A Sol	— = 2 Dardenes —	- :	- $\frac{39}{80}$
A Frank	— = 20 Sols or 1 Livre	- :	9¾
A Crown or *Ecu*	= 60 Sols or 3 Livres	2 :	5¼
A Double Crown	= 120 Sols or 6 Livres	4 :	10½
A Lewis d'Or	= 8 Crowns or 24 Livres	19 :	6

They have likewiſe ½ Crowns, and ¼ Crowns,
½ Franks, and ¼ Franks.

London Exchanges with *Paris*, &c. by the *Ecu* or *Crown*, of 3 Livres or 60 Sols Tournois.

The *Courſe of Exchange* is generally ſomething above 30 Pence Sterling *per* Ecu or Crown.

Examples of Exchanges.

If *London* draws on *Paris* for 356*l.* 18*s.* 10*d.* Sterling, Exchange at 30½*d. per Ecu*; how many Livres, &c. will it amount to?

1

d. Livres *l.* *s.* *d.*

30½ —— 3 —— 356 : 18 : 10

2 2 20

61 6 7138

12

85666

6

Livres

61)513996(8426.164, Hence the Anſ. is 8426 Livres, 3 Sols, 3 Deniers.

488

259

244

159

122

376

366

100

&c.

Note, The *Decimal* of a Livre is brought into Sols and Deniers, juſt as the *Decimal* of a Pound Sterling is brought into Shillings and Pence. And the contrary.

When the firſt Term in the *Rule of Three*, is *Pence*, or *Pence* and *Farthings*, it is generally ſhorter to *reduce* the firſt and third Numbers as above, than to work wholly by Decimals.

Livres *s.* *d.*

A Merchant in *Paris* owes one in *London* 8426 : 3 : 3 how much Sterling Money muſt the Merchant in *London* receive for his Bill drawn for the ſaid Sum, Exchange at 30½*d.* Ster. *per Ecu* or *Crown?*

divide by 3)8426.164 Livres

the Quotient is 2808.7213 Crowns at 30½ d.

d.
30 - ⅛ 351.0901
½ - $\frac{1}{60}$ 5.8515

Sum l. 356.9416 = 356l. 18s. 10d. the Anſwer.

If *London* remits to *France* 82*l.* 15*s.* 4*d.* Ster. the Exchange at 30⅜*d.* *per Ecu*; how many Crowns, Livres, &c. muſt be received in *France* for this Remittance?

d. *Ecu* *l.* *s.* *d.*
30⅜ — 1 — 82 : 15 : 4
8 20
243 1655
12
19864
8
Crowns
243)158912(653.959 = 653 Crowns, 2 *Liv.* 17 Sols, and 6 Den. the Anſwer.

Cro.
.959
mult. 3
Liv. *S.* *D.*
2.877=2 : 17 : 6

Cr. Liv. S. D.
France draws on *London* for 653 : 2 : 17 : 6 the Exchange at 30⅜*d.* *per Ecu*; how much Sterling will that come to?

Liv. *s.* *d.* 3)
Firſt 2 : 17 : 6 = 2.875 Livres, which divide by 3,

the Quotient is .9583 the *Dec.* of a Crown,

then it will be 653.9583 Crowns at 30⅜*d.* *per*.*Cr.*

d.
30 - ⅛ - 81.7448
¼ - $\frac{1}{120}$ - .6812
⅛ - ½ - .3406
l. *s.* *d.*
Anſwer *l.* 82.7666 = 82 : 15 : 4

SECT. X. *Of* Liſbon, Oporto, *&c.*

Liſbon and *Oporto* are the principal Places of Exchange in *Portugal.*

Accounts are kept in general throughout the *Portugal* Dominions in Milreas and Reas (which are imaginary) 1000 Reas making a Milrea. They ſeparate the thouſands or Milreas from the Reas thus 735⊖426, which is as much as to ſay 735 Milreas and 426 Reas.

The *Par* of a *Milrea* is 5*s.* 7$\frac{1}{2}$*d.* *Sterling.*

The Current *Coins* of *Portugal* are as follow, *viz.*

In Copper. They have Vintins, $\frac{1}{2}$ Vintins, and $\frac{1}{4}$ Vintins,

	Reas	*Sterling* *l.* *s.* *d.*
A Vinten is —— —	20	- : - : 1$\frac{7}{20}$
In Silver.		
A Teſtoon = 5 Vintins — —	100	- : - : 6$\frac{3}{4}$
A Cruſade of Exch. = 4 Teſtoons, or $\frac{1}{12}$ Moidore —— —— ——	400	- : 2 : 3
A new Cruſade = 24 Vintins, or $\frac{1}{10}$ Moidore —— ——	480	- : 2 : 8$\frac{2}{5}$
Alſo $\frac{1}{2}$ new Cruſades, and $\frac{1}{2}$ Teſtoons.		
In Gold.		
A Moidore = 48 Teſtoons —	4⊖800	1 : 7 . -
A Joaneſe = 64 Teſtoons —	6⊖400	1 : 16 : -

Alſo Pieces of 4 Joaneſe, Double Joaneſe, $\frac{1}{2}$ Joaneſe, $\frac{1}{4}$ Ditto, and $\frac{1}{8}$ Ditto.

Likewiſe 5 Moidore Pieces, 2$\frac{1}{2}$ Moidore Pieces, $\frac{1}{2}$ Moidores, $\frac{1}{4}$ Ditto, and $\frac{1}{6}$ Ditto

London Exchanges with *Liſbon*, &c. by the *Milrea*, the *Courſe of Exchange* being from 5 Shil. to 5*s.* 8*d.* Sterling, *per Milrea.*

Examples of Exchanges.

London remits to *Oporto* 329*l.* 12*s.* 10*d.* Sterling, what will this Remittance amount to in *Oporto* at 5*s.* $3\frac{5}{8}$ *d. per Milrea?*

d. — *Milrea* — *l.* *s.* *d.*
$63\frac{5}{8}$ —— 1 —— 329 : 12 : 10
8 — 20

509 — 6592
12

79114
8

——*Milreas Reas*
509)632912(1243 ⊖442 *Anſw.*
509

1239
1018

2211
2036

1752
1527

2250
2036

2140
2036

1040
1018

Oporto remits to *London* 1243⊖442 at 5*s.* $3\frac{5}{8}$*d.* Exchange. How much Sterling muſt be paid in London for this Remittance.

12[illegible]3.442 at 5*s.* $3\frac{5}{8}$*d. per Milrea.*

s.
5 - $\frac{1}{4}$ 310.8605
3*d.* - $\frac{1}{20}$ 15.543
$\frac{4}{8}$ - $\frac{1}{6}$ 2.5905
$\frac{1}{8}$ - $\frac{1}{4}$ .6476

l. *s.* *d.*
Anſwer. 329.6416 = 329 : 12 : 10

SECT.

SECT. XI. *Of* Cadiz, Madrid, Bilboa, *&c.*

In *Cadiz*, *Madrid*, and *Bilboa*, which are the principal Places of Exchange in *Spain*, they keep their Accounts in Piaſtres, Rials, and Marvedies, reckoning 34 Marvedie to a Rial Plate, and 8 Rials Plate to a Piaſtre of Exchange.

The *Piaſtre* is imaginary, the *Par* of it is 3 *s.* 7 *d. Ster.*

The Spaniſh *Coins* in *Copper* and *Silver* are, *Sterling.*

	s.	*d.*
A Marvedie. — —	— :	— $\frac{43}{272}$
A Quartil =2 Marvedies, -	— :	— $\frac{43}{136}$
A Rial Plate,=17 Quartiles, or 34 Marv.	— :	5 $\frac{3}{8}$
A Piſtrine, = 2 Rials Plate, -	— :	10 $\frac{3}{4}$
A Dollar, (old Plate) of Sevile,=10 Rials	4 :	6
Ditto, of new=8 Rials Plate, -	3 :	7
Mexico ditto, - - -	4 :	6
Pillar ditto, - - -	4 :	6 $\frac{3}{4}$
Peru ditto, (old Plate) - -	4 :	5
A Croſs Dollar, - -	4 :	4 $\frac{3}{4}$

The above Dollars, and alſo the Fractions of the ſame, are valued according to their Weight.

Their *Gold Coins* are Piſtoles, and Fractions of the ſame.

A Piſtole is 4 Dollars, or 17 *s.* 11 *d. Sterling.*

The Exchange between *London* and *Cadiz*, &c. is in Piaſtres of 8 Rials.

The *Courſe of Exchange* is between 35 and 40 Pence *Sterling* per *Piaſtre.*

TABLES *for turning* Rials and Marvedies *into the* Decimal *of a* Piaſtre, *and the contrary.*

TABLE 1.

Rials.	*D.Parts.*
1	.125
2	.25
3	.375
4	.5
5	.675
6	.75
7	.875

TABLE 2. One Piaſtre the *Integer.*

Mar.	*D.Parts.*	*Mar.*	*D.Parts*	*Mar.*	*D.Parts*	*Mar.*	*D.Parts*
1	.0037	9	.0331	17	.0625	25	.0919
2	0074	10	.0368	18	.0662	26	.0956
3	.0110	11	.0404	19	.0699	27	.0993
4	0147	12	.0441	20	.0735	28	.1029
5	.0184	13	.0478	21	.0772	29	.1066
6	.0221	14	.0515	22	.0809	30	,1103
7	,0257	15	.0551	23	.0846	31	.1140
8	.0294	16	.0588	24	.0882	32	.1176
						33	.1213

Examples of Exchanges.

London remits to *Cadiz* 576 *l.* 12 *s.* $2\frac{3}{4}$ *d. Sterling* Exchange, at $37\frac{7}{8}$ *d. per Piaſtre*; how much muſt be paid for this Remittance at *Cadiz?*

d. *Piaſt.* *l.* *s.* *d.*
$37\frac{7}{8}$ —— 1 —— 576 : 12 : $2\frac{3}{4}$
8 20
303 11532
12
138386
8
Piaſtres.
303)1107094(3653.775
909 Sub. .75 = 6 *Rials.* } *per Tables.*
1980 Rem. .025 = 7 *Mar.*
1818
1629
1515
1144
909
2350
2121
2290
2121
1690
1515

Hence the Anſwer is, 3653 *Piaſt.* 6 *Rials.* 7 *Mar.*

Cadiz remits to *London* 3653 Piaſt. 6 Rials, 7 Mar. at 37$\frac{7}{8}$ *per Piaſtre*, what will the Remittance amount to in *London*?

Piaſtres. *d.*
3653.775 at 37$\frac{7}{8}$ *per Piaſt.*

d.
24 - $\frac{1}{10}$ 365.3775
12 - $\frac{1}{2}$ 182.6887
1$\frac{4}{8}$ - $\frac{1}{8}$ 22.8361
$\frac{3}{8}$ - $\frac{1}{4}$ 5.7090
l. *s.* *d.*
Anſwer, 576.6113=576 : 12 : 2$\frac{3}{4}$

In *Caſtillia*, and in moſt of the *Inland* Towns and Cities in *Spain*, they keep their Accounts in Marvedies, ſeparating the 100ths from the 1000ths, the ſame as they do in *Portugal*, and for Exchange they make Uſe of the imaginary Ducat of 375 Marvedies.

EXAMPLE

Spain is indebted to *London* 432⊖932 Marvedies, Exchange at 53 *d. Sterling per Ducat.* The *Query* is, how much *Sterling* the ſaid Marvedies will amount to?

432932 at 4 *s.* 5 *d.* for 375
s.
4 - $\frac{1}{5}$ 86586.4
4*d.* - $\frac{1}{12}$ 7215.53
1 - $\frac{1}{4}$ 1803.88

375)95605.81(254.949=254 *l.* 18 *s.* 11$\frac{3}{4}$*d.* the Anſwer.
.750
2060
1875
1855
1500
3558
&c.

SECT. XII. *Of* Genoa.

They keep their Accounts here in Pezzoes, Soldi, and Denari, reckoning 12 Denari to a Soldi, and 20 Soldi to a Pezzo of Exchange of 5¾ Lires.

The Pezzoes and Lires are imaginary.

		s.	*d.*	
The *Par* of	A Pezzo is	4 :	4	*Sterling.*
	A Lire, -		9	

They keep their Accounts ſometimes in Lires, Soldi, and Denari.

1 Lire is 20 Soldi of the Lire. And
1 Soldi of the Lire, is 12 Denari of the Lire.

The *Genoeſe* Coins are,	*Sterling.* *s.*	*d.*
A Denari, - - -	— :	—$\frac{9}{240}$
A Soldi, =12 Denari - -	— :	—$\frac{9}{20}$
A Chevalet, = 4 Soldi, - -	— :	1$\frac{4}{5}$
A Teſtoon, =30 Soldi, - -	1 :	1$\frac{1}{2}$
A Genouini, = 6 Teſtoons, -	6 :	9
A Piſtole, =20 Lires, - -	15 :	—
A Spaniſh Piſtole, =24 Lires, -	17 :	11

The *Exchange* between *London* and *Genoa* is in Pezzoes, of 5¾ Lires.

The *Courſe of Exchange* is between 45 and 50 Pence *Sterling per Pezzo* of 5¾ Lires, or 115 Soldi of the Lire each Pezzo, but in computing their Exchanges they reckon (as above mentioned) 12 Denari to a Soldi, and 20 Soldi to a Pezzo. Hence *Exchange* Money is brought into *Lire* Money, and *Lire* Money into *Exchange* Money, as in the two following Examples.

Note, Soldi and Denari are brought into the *Decimal* of a Pezzo, or Lire, the ſame as Shillings and Pence are brought into the *Decimal* of a Pound *Sterling*, and the contrary.

Example 1. Bring 13868 Pezzo, 13 Soldi, 7½ Denari, into *Lire* Money.

Pezzoes.
13868.6812
Mult. 5¾
69343.4060
½ - 6934.3406
¼ - 3467.1703
Lires, 79744.9169=

79744 Lires, 18 Soldi, and 4 Denari.

Or thus,
Pez. *s.* *d.*
13868 : 13 : 7½
5¾
69343 : 8 : 1½
½ - 6934 : 6 : 9¾
¼ - 3467 : 3 : 4¾
Lires, 79744 : 18 : 4

Example 2. Bring 79744 *Lires*, 18 *s.* 4 *d.* into Pezzoes, Soldi, and Denari.

5.75)79744.9166(13868.6811=13868 *P.* 13 *s.* 7½ *d.*
575
2224
1725
4994
4600
3949
3450
4991
4600
3916
&c.

Or thus,
Lire. *Pez.* *Lires.*
5¾——1——79744.9166
4 4
23 318979.6664

23)318979.6664(13868.6811 *Pez.* as before.
23
88
69
199
184
157
&c.

Examples

Examples of Exchanges.

London remits to *Genoa* 1710 *l.* 16 *s.* 4 *d. Sterling*, the Exchange at $47\frac{1}{2}$*d. per Pezzo*; how many Pezzoes, Soldi, and Denari will this Remittance amount to?

d. *Pez.* *l.* *s.* *d.*
$47\frac{1}{2}$——1——1710 : 16 : 4
2 20
95 34216
12
410596
2
Pez. *Pez. S. D.*
95)821192(8644.126 = 8644 : 2 : 6 the Anſwer.
760
611
570
419
380
392
&c.

Genoa draws on *London* for 8644 *Pez.* 2 *Sol.* 6 *D.* Exchange at $47\frac{1}{2}$ *d. per Pezzo*; how much *Sterl.* will that come to?

Pezzoes. *d.*
8644.125 at $47\frac{1}{2}$ *per Pezzo.*
d.
40 - $\frac{1}{6}$ 1440.6875
6 - $\frac{1}{40}$ 216.1031
$1\frac{1}{2}$ - $\frac{1}{4}$ 54.0258

Anſwer, 1710.8164=1710 *l.* 16 *s.* 4 *d. Sterl.*

The ſame by common Arithmetic.

d.			*Pez.*	*S.*	*D.*
			8644	2	6 at 47$\frac{1}{2}$ *d.*
24	-	$\frac{1}{10}$	864	8	3
20	-	$\frac{1}{12}$	720	6	10$\frac{1}{2}$
3	-	$\frac{1}{8}$	108	1	—$\frac{1}{2}$
$\frac{1}{2}$	-	$\frac{1}{6}$	18	—	2
			l. 1710	16	4

London draws upon *Genoa* for 2672*l.* 12*s.* 2$\frac{1}{2}$*d.* Ster. Exchange at 46$\frac{1}{4}$*d.* *per Pezzo* of 5$\frac{3}{4}$ Lires; How many Lires, Soldi, and Denari, muſt be paid for this Draught?

Pence		*Lires*		*l.*	*s.*	*d.*
46$\frac{1}{4}$	—	5$\frac{3}{4}$	—	2672	12	2$\frac{1}{2}$
4		4		20		
185		23		53452		

```
                  53452
                     12
               641426.5
                     23
               19242795
              12828530
                                     Lires
    185)14752809.5(  79744.916 =
          1295
                        79744 Lires, 18 Soldi,
           1802             4 Den. the Anſw.
           1665
            1378
            1295
              830
              740
          Y   &c.
```

How

Lires S. D.
How much Sterling will 79744 : 18 : 4 amount to at 46¼*d. per Pezzo* of 5¾ Lires?

The ſhorteſt way here will be, firſt, to multiply the Price of 1 Pezzo or 5¾ Lires, by 4, which will give the Price of 23 Lires.

s. *d.*
3 : 10¼
4

Lires *Lires*
then if 23 —— 15 : 5 —— 79744.916
s.
10 - ½ - 39872.458
5 - ½ - 19936.229
5*d.* - $\frac{1}{12}$ - 1661.352
l.
23)61470.039(2672.610 =
2672*l.* 12*s* 2¼*d.* the Anſwer.

SECT. XIII. *Of* Leghorn.

They keep their Accounts here in Piaſtres, Soldi, and Denari, reckoning (as at *Genoa*) 12 Denari to a Soldi, and 20 Soldi to a Piaſtre, but the Piaſtre is valued at 6 Lires.

The Lires are imaginary.

		s.	*d.* *Sterling,*
The *Par* of the	Piaſtre is	4 :	4
	Lire ——		8⅔

The *Coins* of *Leghorn* are,			*Sterling.* *s.*	*d.*
A Denari	— —	——	- :	- $\frac{13}{360}$
A Quatrini	—— =	4 Denari	—	- :	- $\frac{13}{90}$
A Soldi	—— =	3 Quatrini	—	- :	- $\frac{13}{30}$
A Craca or Grain	=	5 Quatrini	—	- :	- $\frac{13}{18}$

			s.	d.
A Julio or Paulo —	=	8 Grains —	-	: $5\frac{7}{8}$
A Piaſtre of Exchange	=	120 Soldi —	4	: 4
A Ducat ——	=	150 Soldi —	5	: 5
A Piſtole —	=	21 Lires —	15	: 6

The *Exchange* between *London* and *Leghorn*, is in Piaſtres, at 6 Lires or 120 Soldi of the Lire each Piaſtre.

```
          Pias.  Sol.  Denari.
So that  325  :  5  :  8  make 1951 Lires, 14 Soldi.
        multiply      6
         ——————————————
         1951 : 14 : -
         ——————————————
```

The *Courſe of Exchange* is between 45 and 50 Pence Sterling *per Piaſtre*.

The manner of computing their Exchanges being ſimilar to the Examples in the laſt Section; Examples here are therefore needleſs.

SECT. XIV. *Of* Venice.

Accounts are kept here in Ducats Banco and Gros, which are imaginary, reckoning 24 Gros to a Ducat.

		s.	d Ster.
The *Par* of	A Ducat Banco is	4	: 4.
	A Gros	-	: $2\frac{1}{6}$

Some keep their Accounts in Lires, Soldi, and Denari.

A Lire is 20 Soldi
A Soldi 12 Denari.

The Lire is Imaginary; the *Par* of it is $6\frac{114}{171}$*d. Sterling*, 1 Ducat Banco is $7\frac{4}{5}$ Lires, and 1 Gros is $6\frac{1}{2}$ Soldi.

The *Coins* of *Venice* are,		*s.*	*d. Sterling.*
A Picoli			$\frac{5}{181}$
A Soldi	= 12 Picoli		$\frac{60}{181}$
A Jule	= 18 Soldi		$5\frac{175}{181}$
A Testoon	= 3 Jules	1	$5\frac{1\ 3}{181}$
A Ducat Current	= 124 Soldi	3	4
A Chequin	= 17 Lires	9	2

The *Exchange* between *London* and *Venice* is in Ducats Banco of 24 Gros.

The *Course of Exchange* is between 45 and 50 Pence Sterling, *per Ducat Banco.*

It has been already obſerved that a Ducat Banco is $7\frac{4}{5}$ Lires. Hence Ducats Banco and Gros, are brought into Lire Money, and Lire Money into Ducats Banco, as in the two following Examples.

The annexed Table ſhews the Decimal *of a* Ducat, *for any Number of* Gros.

Gros.	*D. P.*
1	.0416
2	.0833
3	.125
4	.1666
5	.2083
6	.25
7	.2916
8	.3333
9	.375
10	.4166
11	.4583
12	.5
13	.5416
14	.5833
15	.625
16	.6666
17	.7083
18	.75
19	.7916
20	.8333
21	.875
22	.9166
23	.9583

Example 1. Bring 1562 Ducats, and 17 Gros into Lire Money.

```
        Ducats         Lires   Lires.
      1562.7083  at 7 4/5  =  7.8
  mult.      7.8
      ---------
      125016664
     109389581
     ----------
Lires 12189.12474 =
     ----------
```

12189 Lires, 2 Soldi, 6 Denari, the Anſwer.

Note. The *Decimal* of a Lire, is turned into Soldi, and Denari, as the *Decimal* of a Pound Ster. is into Shillings and Pence.

Lires Sol. Den.

Example 2. Bring 12189 : 2 : 6. into Ducats Banco and Gros.

7.8)12189.125(1562.708=
78
——
438
390
——
489
468
——
211
156
——
552
546
——
650
624
——

1562 Duc. 17 Gros.
the Anſwer.

Examples of Exchanges.

London draws on *Venice* for 541 *l.* 18 *s.* 8¼ *d.* Ster. Exchange at 48⅝ *per Ducat Banco*: How many Ducats will it amount to?

d.	*Ducat*	*l.*	*s.*	*d.*
48⅝	— 1 —	541 :	8 :	8¼
8		20		
389		10828		
		12		
		129944		
		8		

——*Ducats*
389)1039554(2672.377 =
2672 Duc. 9 Gros,
the Anſwer.

Venice

Duc. *Grds.* *d.*
Venice draws on *London* for 2672 : 9 Exchange at $48\frac{5}{8}$ *per Ducat*: How much muſt be paid for the ſaid Draught?

	Ducats	*d.*
	2672.377	at $48\frac{5}{8}$
s. 5 - $\frac{1}{4}$	668.094	
d. 5 - $\frac{1}{12}$	55.6745	
- $\frac{1}{8}$	6.9593	the Amount for $\frac{5}{8}$*d.*
4*s.* - $\frac{1}{5}$	534.4754	the uppermoſt Line ÷ 5

Anſwer *l.* 541.4347 = 541*l.* 8*s.* $8\frac{1}{4}$*d.*

When the *Aliquot parts* are not eaſily taken, Queſtions ſimilar to the above, may perhaps be done as ſoon after the following manner

	Ducats	*d.*
	2672.377	at $48\frac{5}{8}$
multiply	—	$48\frac{5}{8}$
	21379.016	
	106895.08	
$\frac{4}{8}$ - $\frac{1}{2}$	1336.18	
$\frac{1}{8}$ - $\frac{1}{4}$	334.04	
	12)129944.31	
	2|0)1082|8 - 8	
	l. 541 : 8 : $8\frac{1}{4}$	as before.

SECT.

SECT. XV.

Examples ſhewing the Advantages *to be made by taking the Opportunity of the* falling *and* riſing *of the* Exchange.

Example 1. The Exchange between *London* and *Amſterdam* being at 35*s.* 6*d.* Flem. *per l.* Sterling, *London* remits to *Holland* 1597½ Guilders; but upon the *fall* of the Exchange to 34*s.* 6*d.* *London* draws for the ſaid 1597½ Guilders back again. What does *London* gain *per Cent* by this Negotiation?

Schil. *l. Ster.* *Schil.*
34.5 —— 100 —— 35.5
35.5
—— *l.*
34.5)3550.0(102.898
345
1000
690
3100
2760
3400
3105
2950
2760

from this Quotient ſubtract 100*l.* the Remainder is 2.898*l.*=2*l.* 17*s.* 11½*d.* And ſo much *London* gains *per Cent.* including Charges, by this Negotiation. As may be made to appear, firſt by finding how much Sterling the 1597½ Guilders will come to, at 35*s.* 6*d.* *per l.* and then at 34*s.* 6*d.* the difference of which Sums will be the whole Gain, by which you may find the Gain *per Cent.*

s. *d.* *l.* *Guild.* *Stiv.*
firſt, if 35 : 6 —— 1 —— 1597 : 10
6 20
Stivers 213 : - 213)31950(150*l* Ster.
213
1065
1065
....0

```
            s.  d.    l.    Guild.  Stiv.
next, if   34 : 6——1——1597 : 10
                6               20
          ———————     ————————  l.
          207 : -     207)31950(154.348
                           207
                           ———
                           1125
                           1035
                           ————
                             900
                             898
                             ———
                              720
                              &c.
```

So that 150*l.* Sterling is paid for the Remittance to *Holland* of $1597\frac{1}{2}$ Guilders, and 154.348*l.* received for the Draught on *Holland* for the ſaid Guilders back again, and conſequently the Gain on 150*l.* Ster. is 4.348*l.* then, As 150*l.* : 4.348*l.* : : 100*l.* : 2.898*l.* the Gain *per Cent.* as before.

Example 2. The Exchange at *Amſterdam* for *London* being at 34*s.* 6*d.* *Holland* remits to *London* 150*l.* Sterling, but upon the *riſe* of the Exchange to 35*s.* 6*d.* *Holland* draws for the ſaid 150*l.* back again: What does *Holland* gain *per Cent.* by this Negotiation?

The Operation to this Queſtion being the ſame as in the laſt, the Gain is the ſame in favour of *Holland*, that is,

Schil. *Guild.* *Schil.* *Guild.*
As 345. : 100 : : 35.5 : 102.898. Hence the Gain in favour of *Holland* is 2.898 Guilders *per Cent.*

SECT. XVI. *Of* Arbitration *of* Exchanges.

When a *Factor* has Orders from his Correſpondent to *remit* a certain Sum of Money to any Place, provided he can do it at a certain Price of Exchange, and then to *Value* or *Draw back* again upon ſome other Place, at a certain Price for the Value of the Sum remitted; it may happen, as the Price of Exchange is continually fluctuating, that there may be a *Loſs* in fulfilling the one Part of his Commiſſion, and perhaps a *Gain* in the other. In ſuch Caſes the *Factor* is to conſider whether the *Gain* in performing one part, will be equal to the *Loſs* by the other; and the Operation neceſſary for ſuch Diſcovery is *Simple Arbitration* of Exchanges: It may be called *Simple Arbitration* as being performed only by *one* Operation in the *Rule of Three*: whereas Queſtions that require *more than one* Operation; which is the Caſe, when inſtead of remitting directly to any certain Place, the Money is firſt remitted through one, two, or more different Countries; the anſwering ſuch Queſtions is called *Compound Arbitration.*

Examples in Simple Arbitration.

An Order comes to *London* to remit to *Venice* 1000 Ducats at 48*d. per Ducat*, and to draw upon *Spain* for the Value at 38*d. per Piaſtre*; when the Order came to hand, Bills for *Venice* were at 50*d.* At what Price muſt *London* draw upon *Spain*, to compenſate the ſaid Loſs by the Remittance to *Venice?*

d. *d.* *d.*
48——50——38
50
——
Anſwer.
48)1900($39\frac{7}{12}$*d.* *per Piaſtre*, that is, *London* muſt draw upon *Spain* at $39\frac{7}{12}$*d. per Piaſtre*, to compenſate the aforeſaid Loſs, as is evident from the following Work.
144
——
460
432
——
28
—— = $\frac{7}{12}$
48

Firſt, 1000 Ducats at 4*s.* come to 200*l.* Ster.

s.

4 - $\frac{1}{5}$ 200

Next, for the Draught on Spain at 38*d.* *per Piaſtre.*

d. *Pias.* *l.*

If 38 —— 1 —— 200

240

—— *Piaſtres*

38)48000(1263.158.

According to the Order, *London* is to draw upon *Spain* for 1263.158 Piaſtres.

Now for the 1000 Ducats at 50*d.*

50

12)50000

2|0)416|6 - 8

l. 208 : 6 : 8

d. *Pias.* *l.* *s.* *d.*

Laſtly, if $39\frac{7}{12}$ —— 1 —— 208 : 6 : 8

12 20

475 4166

12

50000

12

—— Piaſtres.

475)600000(1263.158 as before.

Hence it appears that remitting to *Venice* at 50*d.* *per Ducat*, and Drawing on *Spain* at $39\frac{7}{12}$*d.* *per Piaſtre*, comes to the *ſame Number of Piaſtres* as remitting at 48*d.* and drawing at 38*d.* according to the Order.

An Order comes to *Amſterdam* to remit to *Genoa* at 82*d* *per Pezzo*, and to draw upon *London* for the value at 33*s.* 4*d.* *per l. Sterl.* When the Order came to hand, Bills for *Genoa* were at 85*d.* At what Price muſt *Amſterdam* draw upon *London* to compenſate the ſaid Loſs by the Remittance to *Genoa*?

```
 d.        d.         s.   d.
 82————————85—————————33 : 4
                      85
                     ———
                     165
     d.             264
     4  -  ⅓         28 : 4
                   ———————   s.   d.
                82)2833 : 4(34 : 6⅝
                   246
                   ———
                    373
                    328
                    ———
                     45
                     12
                   ————
                 82)544(6
                    492
                    ———
                     52
                      8
                    ———
                 82)416(5
                    410
                    ———
                      6
```

Amſterdam muſt draw upon *London* at 34*s.* 6⅝*d.* *per l.*

A of *Amſterdam* orders *B* of *Paris* to remit to *London* at 30 *d. per Crown*, and to value himſelf upon him at 54 Grotes *per Crown*, but upon Receipt of the Order he finds *Paris* Exchange upon *London* at $30\frac{1}{2}$ *d.* and upon *Amſterdam* at $54\frac{3}{4}$ Grotes. Now the Query is, if at theſe Rates the Order could be performed?

d. *d.* *d.*

$30 — 54 — 30\frac{1}{2}$

2 61 2

60 54 61

324

6|0)3294

54.9 Grotes.

So that this Order may be performed with Profit, becauſe if the Remittance to *London* be at $30\frac{1}{2}$ *d.* the Draught on *Amſterdam* may be at $54\frac{9}{10}$ *d.* and their preſent Bills are at leſs, namely, at $54\frac{3}{4}$ *d.*

Paris orders *London* to remit at $30\frac{1}{4}$ *d. per Crown*, and to value himſelf upon *Amſterdam* at 36 *s.* 2 *d. per l.* when the Order came, the Exchange at *London* upon *Paris* was at $30\frac{3}{4}$ *d.* at what Rate muſt *London* draw upon *Amſterdam* to compenſate the Loſs by the Remittance to *Paris*?

d. 121. *d.*

$30\frac{1}{4} — 36 : 2 — 30\frac{3}{4}$

4 4

726

121 363 123

2*d.* - $\frac{1}{6}$ 20 : 2

123)4376 : 2(at 35 *s.* 7 *d.* *London* muſt draw upon *Amſterdam.*

369

686

615

71

12

123)854(7

861

Rome is indebted to *Naples* 2000 Stampt Crowns, and accordingly *Naples* orders *Lions* to draw upon *Rome* for the ſaid Crowns, at 42 Stampt Crowns for 100 French Crowns, and to remit the ſaid Sum to *Naples* at $75\frac{1}{2}$ Ducats for 100 Crowns: But when this Commiſſion arrived, Bills for *Naples* were at $74\frac{2}{3}$ Ducats; the Queſtion is, how muſt *Lions* draw upon *Rome*, ſo as to be able to remit to *Naples* the Number of Ducats intended by the Order, allowing $\frac{2}{5}$ *per Cent.* for his Commiſſion?

Ducats. *Crowns.* *Ducats.*
$75\frac{1}{2}$——42——$74\frac{2}{3}$
6 6
453 448
42
896
1792
Crowns. *Crowns.*
453)18816(41.53642=$41\frac{17}{32}$
nearly:

Lions muſt draw upon *Rome* at 41.53642 *Crowns*, as will appear by finding how many Ducats the 2000 Stampt Crowns will amount to; firſt, at the commiſſioned Price, and then at the laſt Price to *Naples*, and at 41.53642 Crowns to *Rome*.

Firſt, at the commiſſioned Price,

Stampt Cr. *Crowns.* *Stampt Cr.*
If 42——100——2000
2000

42)200000(4761.905 *Fr. Crowns.*
Multiply .004=$\frac{2}{5}$ *per Cent.* his Commiſſion.
The Commiſſion 19.047620 to be ſubtracted.

Remains 4742.8574 Crowns,
to be remitted to *Naples*, at 75½ Ducats *per* 100

23714.2870
332000.018
½ 2371.4287

3580.857337 Ducats muſt be remitted to *Naples* according to the Commiſſion at 42 to *Rome*, and 75½ to *Naples*.

Now, for the Amount at 41.53642 Crowns to *Rome*, and at 74⅔ Ducats to *Naples*.

St. Crowns.	*Crowns.*	*St. Crowns.*
41.53642	100	2000

41.53642)200000(4815.051 Crowns
Mult. .004 as before.

Commiſſion 19.260204 which ſubtract.

Remains 4795.7908 Crowns.
at 74⅔ Ducats, *per* 100

19183.1632
335705.356
⅓ 1598.5969
⅓ 1598.5969

3580.85713 Ducats as before.

Hence it is evident that the Commiſſion may be performed according to the two laſt Courſes, that is, at 41.53642 Crowns to *Rome*, and 74⅔ Ducats to *Naples*.

Exam-

Examples for finding the Par *of Exchange.*

France negociates with *Amſterdam* at 54½ *d. per Ecu*, and with *London* at 30½ *per Ecu*. At what muſt the *Exchange* be between *Amſterdam* and *London* to be *Par* with the above Courſes.

```
 d.         Grotes.        s.
30.5 ———— 54.5 ———— 20
            20
          ——————
     30.5)1090.0(Anſwer, 35 Schil. and 9 Grotes
          915
          ————
          1750
          1525
          ————
           225
            12
          ————
      305)2700(9
          2745
          ——————
```

Amſterdam negociates with *London* at 35 *s.* 11 *d. per l.* and with *Hamburgh*, at 32½ *Stivers per Dollar* (of 32 Shillings Lubs, or 64 Grotes) what muſt the Exchange between *London* and *Hamburgh* be?

```
   Stivers. Grotes.    s.  d.
     32½ ——— 64 ——— 35 : 11
      2                  8×8=64
    ————             ————
Grotes 65            287 : 4
                           8
                     ————  s.  d.
              65)2298 : 8 (35 : 4 the Anſ.
                 195
                 ————         23 : 8
                 348          12
                 325          ———
                 ————      65)284(4
                  23          260
                              ———
                               24
```

Hamburgh remits to *Amſterdam* at 33 Stivers *per Dollar*, (of 32 Shillings Lubs) and to *Venice* at 88 Grotes *per Ducat*; what muſt be the Courſe between *Amſterdam* and *Venice*, that is, how many Grotes for a Ducat?

```
Shillings lubs.  Stiv.   Grotes.
    32 ———— 33 ———— 88
                88
              ——————
               264
              264
              ————
        32)2904(90¾ Grotes Anſw.
           288
           ————
             24
```

The firſt and ſecond Numbers are not brought into Grotes, becauſe 2 is a common Multiplier to both.

London negociates with *Antwerp* at 36 *s. per l.* and to *Leghorn* at 47 *d. per Piaſtre*; what muſt be the Courſe between *Antwerp* and *Leghorn*, that is, how many Grotes for a Piaſtre?

```
    s.        s.        d.
    20 ———— 36 ———— 47
              47
             ————
             252
            144
           ——————
        2|0)169|2
           ——————
Anſwer, at  84⅗  Grotes the Courſe between Antwerp
           ——————                       and Leghorn.
```

SECT. XVII. Compound Arbitrations.

Amſterdam hath Orders to remit a certain Sum to *Cadiz*. At the Time of this Order, *Amſterdam* can remit to *Cadiz* at 94¾ *d. per Ducat*, (of 375 Marvedies) and *London* to *Cadiz* at 38 *d. per Piaſtre*, (of 272 Marvedies). The

Query is, whether it will be moſt advantageous to *Amſterdam* to remit directly to *Cadiz*, or to do it by the Way of *London*; the Exchange between *Amſterdam* and *London* being at 35 *s.* 10 *d. per l.*

The Exchanges to the ſame Place being different in this Query, it will therefore require two Suppoſitions to reſolve the ſame, the firſt being to find the *Price* of the *Piaſtre*, with regard to *London Exchanges*, and the ſecond to find the *Price* of the *Ducat* with regard to the ſame.

s. — *s.* *d.* — *d.*
Firſt, if 20 —— 35 : 10 —— 38
38
———
280
d. 105
6 - $\frac{1}{2}$ 19
4 - $\frac{1}{3}$ 12 : 8
———
2|0)136|1 : 8
———
$68\frac{1}{12}$ *d.* the Price of the Piaſtre of 272 Marvedies, with regard to *London Exchanges.*

Marv. — *d.* — *Marv.*
Then, if 272 —— $68\frac{1}{12}$ —— 375
$68\frac{1}{12}$
———
3000
2250
$\frac{1}{12}$ 31
———
272)25531($93\frac{13}{16}$*d.* the Price of the Ducat with regard to *London* Exchanges.
2448
———
1051
816
———
$\frac{235}{272} = \frac{13}{16}$ nearly.

So that *Amſterdam*, by remitting by the Way of *London* at 93$\frac{13}{16}$ *d. per Ducat*, inſtead of remitting directly at 94$\frac{3}{4}$*d. per Ducat*, gains by the Negociation, including Commiſſion, &c. about 1 *per Cent.*

By the Work of this Queſtion it plainly appears, that *Compound*, as well as *Simple* Arbitrations, may be done by the *Rule of Three*; but as this Method is ſomewhat tedious in the former, I ſhall next ſhew *the general Rule* (which is deduced from the Rule of Three) for anſwering all Queſtions in Compound Arbitrations, and alſo Queſtions concerning the *Compariſon of Weights and Meaſures.*

In order to ſhew how this Rule is derived from the *Rule of Three*, let the firſt Term in each Stating of the laſt Example be called an Antecedent, and the laſt Term in each Stating, with the middle Term in the firſt, be called a Conſequent: Then it is eaſy to conceive, that the Product of all the Conſequents multiplied together, and divided by the Product of the Antecedents, will be the Anſwer required; which is a *general Rule* for all Queſtions in *Compound Arbitrations*, &c.

But for the ready placing of the Terms, obſerve the following Directions, *viz.*

1. Place the Antecedents and Conſequents in two Columns, the Antecedents in a Column on the Left-hand, and the Conſequents on the Right.

2. The firſt Antecedent muſt be of the Species of the Place that gives a certain Sum in Exchange, and of which the Par or Equality is ſought, and the firſt Antecedent and laſt Conſequent muſt always be of the ſame Species.

3. The firſt Conſequent and ſecond Antecedent muſt be the ſame; likewiſe the ſecond Conſequent and third Antecedent; alſo the third Conſequent and fourth Antecedent. Which Order muſt be obſerved throughout the whole.

Laſtly, The Terms being thus diſpoſed, then (agreeable to the *general Rule* above mentioned) multiply all the Antecedents together, and all the Conſequents together, and divide the Product of the Conſequents by the Product of the Antecedents, and the Quotient will be the Anſwer.

Theſe Directions being obſerved, the laſt Example being to find how many Grotes of *Amſterdam*, one *Spaniſh*

Ducat of 375 Marvedies will amount to by the Way of *London*, it will ſtand thus,

Antecedents. *Conſequents.*

If 272 Marvedies =38 Pence *Sterl.*
And 240 Pence *Sterl.* =35 *s.* 10 *d.*=430 *d. Amſt.*
How much Money of *Amſter.*=375 Marvedies.

Firſt, 272×240=65280 the Diviſor,

And 38×430×375=612750 the Dividend.

Then 65280)612750($93\frac{5646}{6528}$, or $93\frac{13}{16}$ Grotes, nearly, as before.

That is, $93\frac{13}{16}$ Grotes is an Antecedent, or equal to 375 Marvedies, the Anſwer required.

This Rule is the more uſeful, as the Work may frequently be contracted, by dividing any of the Antecedents and Conſequents by any Number or Numbers that will divide both, leaving no Remainder; which is founded upon this *Axiom*, that equal Numbers, divided by equal Numbers, their Quotients will be equal; and it is plain in the laſt Queſtion, that if the Anſwer $93\frac{5646}{6528}$ Grotes be placed as an Antecedent to 375; that then the Product of all the Antecedents muſt be equal to the Product of all the Conſequents, and therefore (by the above Axiom) any of the Antecedents and Conſequents being divided by the ſame Number, the Product of the reſpective Quotients will be equal; and hence alſo it is obvious, that if any of the Antecedents has a like Number with any of the Conſequents, ſuch Number may be cancelled in both.

To apply this to the laſt Queſtion, place *A* over the Antecedents, and *C* over the Conſequents.

A. *C.*

2)272 2)38

136 19

3)24|0 43|0

8

3)375

125

Here the Antecedent 272 and Conſequent 38 are divided by 2. The Antecedent 240, and Conſequent 430 are divided by 10. And the Antecedent 24, and Conſequent 375 by 3. And the Quotients collected out will ſtand as follows.

	A.	*C.*
If	136 Mardevies =	19 Pence *Sterl.*
And	8 Pence *Sterl.* =	43 Grotes *Amſter.*
How many Grotes in	125 Marvedies.	

Then 19×43×125=102125 the Dividend.

And 136×8=1088)102125(93$\frac{941}{1088}$=93$\frac{13}{16}$ nearly, as before.

A Banker in *Paris* remits to his Factor in *Amſterdam* 455 Crowns *Tournois*, firſt to *London*, at 30 *d.* *per* Crown; from *London* to *Rome* at 65 *d.* *per* Stampt Crown; from *Rome* to *Venice* at 100 Stampt Crowns, for 140 Ducats Banco; from *Venice* to *Legborn* at 100 Ducats Banco, for 100 Piaſtres of *Legborn*; and from *Legborn* to *Amſterdam* at 86 Grotes *per* Piaſtre: The Queſtion is, how many Guilders Banco will be received at *Amſterdam*, no Deduction being made for Charges?

Antecedents.		*Conſequents.*
1 Crown	-	5)30 *d.* *Ster.*
		6
5)65 *d.* *Ster.*	-	1 Crown *Rome.*
13		
20)100 Crowns *Rome.*		20)140 Ducats *Venice.*
5)5(1·		7

100 Ducats *Venice*. - 100 Piaſtres *Leghorn*.
1 Piaſtre *Leghorn*. - 86 Grotes *Amſt.*

How many Guilders for 5)455 Crowns

91
Mult. 6

546
7

3822
86

Diviſor 13)328692

4|0)2528|4 Grotes

Anſwer, 632 Guilders and 2 Stivers.

To prove any Queſtion in this Rule, begin with the laſt Conſequent but one, and end with the Anſwer or Antecedent laſt found; ſo all the Antecedents will in the Proof become Conſequents, and the contrary; then multiply and divide as before.

See the Proof to the laſt Queſtion.

86 Grotes - - 1 Piaſtre
100 Piaſtres - - - 100 Ducats
20)140 Ducats - - 20)100 Crowns

7)7(1 5

1 Crown - - 5)65 *d. Sterl.*

13
5(30 *d. Sterl.* - 1 *French* Crown

6)6(1

How

7)
How many Crowns for 25284 Grotes?

6)3612

602
5

3010
13

Diviſor, 86)39130(455 Fr. Crowns, the Anſwer.

Amſterdam being to remit to *London* 750 *l. Flemiſh*, he firſt ſends it to *France* at 54 *d. per* Crown; from thence to *Venice*, at 100 Crowns for 56 Ducats Banco; from thence to *Hamburgh*, at 100 Grotes *per* Ducat; from thence to *Portugal* at 45 Grotes *per* Cruiſade of 400 Reas; and from *Portugal* to *London* at 5 *s.* 3 *d.* for 1000 Reas; and ſuppoſe the Commiſſion, &c. at each Place to be ½ *per Cent.* The *Query* is, how much *Sterling* muſt be received in *London* for this Remittance, and whether more or leſs, than if it were remitted directly from *Amſterdam* to *London*, the Exchange being at 35½ Schillings *per l.*

6)54 Grotes	-	1 Crown
9		
100 Crowns	-	8)56 Ducats
		7
1 Ducat	-	100 Grotes
9)45 Grotes	-	5)400 Reas
5)5(1		80
125)1000 Reas	-	9)63 Pence
8)8(1		7

How much *Sterl.* for 6)750 *l. Flemiſh.*

125)125(1

7
80

560
7

9)3920

l. 435.5555

The Remittance, excluſive of Charges, amount to 435.5555 *l. Sterling.*

Now, for the Money to be received, deducting $\frac{1}{2}$ *per Cent.* for Commiſſion, &c. at each Place, namely at *France*, *Venice*, *Hamburgh* and *Portugal.*

	435.5555		433.3778
Mult.	.005 = $\frac{1}{2}$ *per Cent.*	Mult.	.005
Sub.	2.1777	Sub.	2.1669
Rem.	433.3778	Rem.	431.2109
	431.2109		429.0548
Mult.	.005	Mult.	.005
Sub.	2.1561	Sub.	2.1453
Rem.	429.0548	Rem.	426.9095

The Money to be received is 426.9095 *l.* or, 426 *l.* 18*s.* 2$\frac{1}{4}$ *d. Sterling.*

Note, It would come pretty near the ſame, if inſtead of multiplying as above, to multiply the 435.5555 by .02 (the Product of .005×4) and ſubtract the Product.

Next for the Amount, if it had been remitted directly from *Amſterdam* to *London* at 35½ *s. per l.*

s. *l.* *l.*
35.5——1——750
20 *l.*
—— 426.909
35.5)15000(422.535 Sub.
l. *s.* *d.*
Remains 4.374=4 : 7 : 5¾

So that *London* receives by the Remittance, being by the way of *France*, *Venice*, &c. 4 *l.* 7 *s.* 5¾ *d.* more (after the Charges are deducted) than if it had been remitted directly to *London*.

S E C T. XVIII.

The general Rule in the laſt Section applied to the Compariſon of Weights and Meaſures.

An *Example* of *Weights.*

Suppoſe 100 ℔. of *Amſterdam* be equal to 100 ℔. of *Paris*; and 100 ℔. of *Paris* to be 150 ℔. in *Genoa*; and 100 ℔. of *Genoa* to be 70 ℔. in *Leipſick*; and 100 ℔. of *Leipſick* to be 160 ℔. in *Milan*. How many *Milan* Pounds will equiponderate 548 ℔. of *Amſterdam*?

100 ℔. *Amſterdam*	100 *Paris*
50)100 *Paris* - -	50)150 *Genoa*
2)2(1 - -	3
2)10|0 *Genoa* - -	7|0 *Leipſick*
5	
20)100 *Leipſick* - -	20)160 *Milan*
5	2)8
	2)4(2

How many Pounds will weigh 548 *Amſterdam?*

2

1096

7

7672

3

$5 \times 5 = 25)23016(920\frac{16}{23}$ ℔. of *Milan*, the Anſwer.

An *Example* of *Meaſures.*

Suppoſe that 9 Yards of *London* be equal to 7 Ells of *France*, and 7 Ells of *Holland* to 4 Ells of *France*, and that 1 Ell of *Holland* be equal to $1\frac{1}{5}$ Ell of *Hamburgh*: How much *Sterling* will 81 Yards Cloth coſt in *London* at 3 *l.* *Sterling* for 7 *Hamburgh* Ells?

Note, If there be a Fraction in any of the Numbers, both the Antecedent and Conſequent muſt be multiplied by the Denominator of the ſaid Fraction, ſo that if 1 Ell of *Holland* be equal to $1\frac{1}{5}$ Ell of *Hamburgh*; 5 Ells of *Holland* will be equal to 6 Ells of *Hamburgh.*

9)9 Yards *London* - 7 Ells *France*

1

2)4 Ells *France* - 7 Ells *Holland*

2

5 Ells *Holland* 2)6 Ells *Hamburgh*

3

7 Ells *Hamburgh* 3 *l. Sterling*

9)

How much *Sterling* for 81 Yards *London*

9

$9 \times 7 \times 3 \times 3 = 567$ the Dividend.

$2 \times 5 = 10)567(= 56$ *l.* 14 *s.* the Anſwer.

I might here inſert Tables of foreign Weights and Meaſures, but chooſe rather to refer thoſe who may want to be acquainted with them, to the Univerſal Tables of the Weights and Meaſures of the World, lately publiſhed by Mr. *Paraire.*

CHAP. IX.

Shewing the Nature *and* Conſtruction *of* DECIMAL TABLES *of* INTEREST, *and their* Uſe *in anſwering Queſtions in* SIMPLE *and* COMPOUND INTEREST, Annuities, *&c. alſo,* Annuities *on* Lives.

THE Manner of working *Intereſt* by the Pen was ſhewn in *Chap.* 7. and it was there obſerved, that the moſt eaſy and expeditious Method of anſwering Queſtions both in *Intereſt* and *Annuities* is by *Tables*: I ſhall therefore in this *Chap.* ſhew the *Conſtruction* and *Uſe* of *Tables* for that Purpoſe.

SECT. I. Simple INTEREST.

By *Table* 1. (which begins a few Pages forward) is found the *Simple Intereſt of any Sum* to 10000 *l.* for any Number of *Days* at 5 *per Cent.* and by *Table* 2. the *Intereſt of any Sum* whatever for any Number of *Years* to 40 at the ſame *Rate.*

And the Intereſt being found at 5 *per Cent.* may with the greateſt Eaſe be known at any other uſual *Rate*, as 3, 3½, 4, *&c.* without Tables of different Rates, as I ſhall ſhew hereafter.

The Numbers in the reſpective Columns of the *firſt Table*, ſhew the *Intereſt* from 1 *l.* to 9, (expreſſed in the decimal Parts of a Pound) for the *Days* in the firſt Column againſt which they ſtand. And in like Manner the Numbers in the *ſecond* Table, ſhew the *Intereſt* for *Years.*

'Tis needleſs to ſay any Thing here of the *Excellency* of *Decimal Tables* of Intereſt beyond *thoſe* which expreſs the Intereſt in common Money, as their ſuperior Uſe will appear in the Manner of uſing them, but firſt of their *Conſtruction*.

The *firſt* Number in the Column under 1 *l.* *Table* 1. being the *Intereſt* of 1 *l.* for a *Day*, at 5 *per Cent.* is found by only dividing .05 *l.* *the Intereſt of* 1 *l.* *for a Year* (at that Rate) by 365, and the *Quotient* to ſix Places of Decimals will be found .000136 with a Remainder of 360, which may ſtand thus, $.000136\frac{360}{365}$, which is the exact *Intereſt* of 1 *l.* for a *Day* at 5 *per Cent.* and the *Vulgar Fractional Part* being abbreviated, it will be $.000136\frac{72}{73}$, and this being continually added in the Manner directed (*Page* 55) for making the *Decimal Tables* of *Weight* and *Meaſures* will conſtitute the firſt Column next to that of *Days*. And the *firſt* Numbers in the Columns under 2 *l.* 3 *l.* 4 *l.* *&c.* to 9 *l.* are the 2d, 3d, 4th, *&c.* Numbers in the firſt Column. And by continually adding the *firſt* Number of each Column, the whole *Table* is conſtructed.

As to the *Conſtruction* of the *ſecond Table*, it is juſt ſimilar to the *firſt*; the *firſt* Column next to that of Years being made, by continually adding the Intereſt of 1 *l.* for a *Year*; and the *ſecond* Column by continually adding the Intereſt of 2 *l.* for a Year, and ſo on for every Column.

I come now to ſhew the *Uſe* of theſe Tables; firſt, when the *Rate* of Intereſt is 5 *per Cent.* (at which they are calculated) and then at any other *Rate*.

The Uſe of the Tables *of* Simple Intereſt.

In order to make theſe Tables univerſally uſeful, the Reader is to obſerve, that if a Number conſiſts of only one Digit with Cyphers affixed, as 10, 50, 700, 9000, *&c.* 'tis called a *pure Number*; but thoſe Numbers which conſiſt of more than one, or wholly of Digits, as 370, 568, 7569, *&c.* may be called *Mixed Numbers*. Now every *Mixed* Number may be reſolved into thoſe *pure Numbers*, of which it is compoſed; thus the *Mixed* Number 567, may be reſolved into the *pure* Numbers 500, 60, and 7; ſo alſo 15890 is reſolved into 10000, 5000, 800, and 90.

This being premiſed, obſerve theſe Directions,

1. If the Sum whoſe Intereſt is required be a *Mixed* Number, let it be reſolved into *pure* Numbers.

2. With the *pure* Numbers ſeverally enter the Tables, and in thoſe Columns marked at the Top with the Digits of each *pure* Number, take out thoſe *Decimal Numbers* which ſtand even with the Number of *Days* or *Years*, for which the Intereſt is required.

3. Remove the *Decimal point* in each ſuch *Decimal* Number ſo many Places to the *right-hand*, as there are *Cyphers* in the reſpective *pure* Numbers.

4 Laſtly, Add together all the *Decimal Numbers* and their *Sum* will be the Intereſt at 5 *per Cent.*

EXAMPLE I.

What's the Intereſt of 528*l.* for 96 Days, at 5 *per Cent*?

In *Table* 1. even with 96 days, you find under the *pure* Numbers.		*Decimals*
	500 -	6.5753
	20 -	.2630
	8 -	.1052
		l. *s.* *d*
The Anſwer		6.9435=6: 18 : 10$\frac{1}{2}$

EXAMPLE II.

What's the Intereſt of 436*l.* 7*s.* 6*d.* for 253 Days, at 5 *per Cent.*

It was obſerved, *Page* 105, &c. that *two places* of Decimals are ſufficient for the Shillings and Pence; in a Sum whoſe Intereſt is required for no greater Time than a *Year*, and *three Decimal places* in finding the Intereſt for *Years.* And

The above Sum expreſſed Decimally to *two places* will be the *mixed* Number 436.37*l.* which being reſolved will ſtand thus,

In *Table* 1. even with 253 Days, you find under the *pure* Numbers.		
	400. -	13.863
	30. -	1.0397
	6. -	.2079
	.3 -	.0103
	.07 -	.0024
		l. *s.* *d.*
Anſwer		15.1233=15 : 1 : 5$\frac{1}{2}$

Note, The Decimal of a *mixed* Number, being reſolved into *pure Decimal* Numbers, the Reader muſt obſerve, that in taking out the Intereſt of the *Decimal Numbers* to move the Decimal point ſo many Places to the *Left-hand*, as there are Places in the *ſaid Numbers*, as in the laſt and following Example.

EXAMPLE III.

What's the Intereſt of the laſt Sum 436*l.* 7*s.* 6*d.* for 18 Years at 5 *per Cent.*

The Intereſt here being for *Years*, requires the Decimal for the odd Money to *three* Places. The above Sum is exactly equal to 436.375*l.* which reſolve as before.

In *Table* 2, even with 18 Years, you find under the *pure* Numbers.	400.	-	360.
	30.	-	27.
	6.	-	5.4
	.3	-	.27
	.07	-	.063
	.005	-	.0045
			l. *s.* *d.*
	Anſwer		392.7375=392 : 14 : 9

Theſe Examples ſhew the Uſe of the Tables when the *Rate* of Intereſt is 5 *per Cent*, I ſhall next give two ſhort general Rules for finding the Intereſt *at any other Rate.*

Rule 1. If the *Rate* be *Pounds*, or *Pounds and half-Pounds*, which are the moſt uſual Rates of Intereſt. Firſt, find by the *Tables* the Intereſt at 5 *per Cent.* which multiply by *as many Tenths as there are half-pounds* in the given *Rate*, the *Product* will be the *Intereſt* required. Thus if the *Rate* be 3 *per Cent.* multiply by .6; if 3 ½, multiply by .7, &c.

Rule 2. If there are *Quarters* in the given *Rate* (but this is ſeldom the Caſe) multiply the Intereſt found at 5 *per Cent.* by as many *Hundredths* as there are *Shillings* in the ſaid *Rate*, the *Product* will be the Anſwer. Thus if the *Rate* be 3¼, multiply by .65; if 3¾, multiply by .75, &c.

EXAMPLE

EXAMPLE IV.

What's the Intereſt of 9430*l.* for 63 Days at 4 *per Cent.*

In *Table* 1. even with 63 Days, you find under the *pure* Number.
9000 - 77.671
400 - 3.4521
30 - .2589

The Int. at 5 *per Cent.* 81.3820
Then *per Rule* 1, mult. by .8 the *half-pounds* in the *Rate* being 8.

The Int. at 4 *per Cent.* 65.10560=65*l.* 2*s.* 1 *d.*

EXAMPLE V.

What's the Intereſt of 875*l.* 12*s.*=875.6*l.* for 21 Years at 3½ *per Cent.*

In *Table* 2. even with 21 Years, you find under.
800. - 840.
70. - 73.5
5. - 5.25
.6 - .63

The Int. at 5 *per Cent.* 919.38
multiply by .7 *per Rule* 1.

The Int. at 3½ *per Cent.* 643.566=643*l.* 11*s.* 3¾*d.*

EXAMPLE VI.

What's the Intereſt of 672*l.* for 126 Days, at 4¼ *per Cent.*

In *Table* 1. even with 126 Days, you find under.
600 - 10.3562
70 - 1.2082
2 - .0345

The Int. at 5 *per Cent.* 11.5989
mult. by .85 *per Rule* 2:

579965
927912

The Int. at 4¼ *per Cent.* 9.859065=9*l.* 17*s.* 2¼*d.*

It is plain by the 4th and 5th Examples, that the Intereſt of any Sum (under 10000*l.* if required for Days) may be almoſt or quite as readily found at the moſt *uſual Rates* by means of *theſe Tables* calculated only at 5 *per Cent.* as by *common Tables* of Intereſt, which if calculated at different Rates, *i. e.* at 3, 3¼, &c. to 5 *per Cent.* would be fifteen times as large; indeed when there are *Quarters* in the *Rate* (as in the laſt Example) the Intereſt is not quite ſo readily found, the Multiplication being ſomething larger, but this I believe ſeldom or never happens, except when the Intereſt is required for *juſt a Year*, as in the 3d *Example* of the 7th *Chap.* and the Intereſt of any Sum for a *Year*, I think in general may be found very near or quite as ſoon by the Methods there taught as by any Tables whatever.

To the two Tables of Simple Intereſt, might be added a third for finding the preſent Worth or Diſcount of any Sum; but as the cuſtomary Method of diſcounting a Sum, is by finding the Intereſt thereof, a Diſcount Table (at Simple Intereſt) is not neceſſary.

It being often wanted in Queſtions relating to *Time*, but particularly in the whole affair of *Intereſt* to know the *Number of Days* from one Time to another, it will be here proper to inſert a uſeful Table for that Purpoſe.

A Table *of* Days *for any given Time.*

Days.	*January.*	*February.*	*March.*	*April.*	*May.*	*June.*	*July.*	*Auguſt.*	*September.*	*October.*	*November.*	*December.*
1	1	32	60	91	121	152	182	213	244	274	305	335
2	2	33	61	92	122	153	183	214	245	275	306	336
3	3	34	62	93	123	154	184	215	246	276	307	337
4	4	35	63	94	124	155	185	216	247	277	308	338
5	5	36	64	95	125	156	186	217	248	278	309	339
6	6	37	65	96	126	157	187	218	249	279	310	340
7	7	38	66	97	127	158	188	219	250	280	311	341
8	8	39	67	98	128	159	189	220	251	281	312	342
9	9	40	68	99	129	160	190	221	252	282	313	343
10	10	41	69	100	130	161	191	222	253	283	314	344
11	11	42	70	101	131	162	192	223	254	284	315	345
12	12	43	71	102	132	163	193	224	255	285	316	346
13	13	44	72	103	133	164	194	225	256	286	317	347
14	14	45	73	104	134	165	195	226	257	287	318	348
15	15	46	74	105	135	166	196	227	258	288	319	349
16	16	47	75	106	136	167	197	228	259	289	320	350
17	17	48	76	107	137	168	198	229	260	290	321	351
18	18	49	77	108	138	169	199	230	261	291	322	352
19	19	50	78	109	139	170	200	231	262	292	323	353
20	20	51	79	110	140	171	201	232	263	293	324	354
21	21	52	80	111	141	172	202	233	264	294	325	355
22	22	53	81	112	142	173	203	234	265	295	326	356
23	23	54	82	113	143	174	204	235	266	296	327	357
24	24	55	83	114	144	175	205	236	267	297	328	358
25	25	56	84	115	145	176	206	237	268	298	329	359
26	26	57	85	116	146	177	207	238	269	299	330	360
27	27	58	86	117	147	178	208	239	270	300	331	361
28	28	59	87	118	148	179	209	240	271	301	332	362
29	29		88	119	149	180	210	241	272	302	333	363
30	30		89	120	150	181	211	242	273	303	334	364
31	31		90		151		212	243		304		365

The Uſe of the Table.

Firſt, To know the *Number* of *Days* from the *End* of the *Year*, to any given *Day*, of any Month in the Year following.

This is obtained by Inſpection only; thus from December the 31ſt, to September the 7th following is 250 Days: To November the 27, are 331, &c.

Secondly, To know what is the Number of *Days* from any given *Day* of any *Month* to the *End* of the *Year*.

Suppoſe September the 7th, then from —— 365
Subtract the Number anſwering to September 7. 250

There remains the Number of Days ſought, *viz.* 115 Days

Thirdly, To find the *Number* of *Days* between the given *Day* of any one *Month*, and any given *Day* of any other *Month* in the *ſame Year*.

For Inſtance, to know how many Days there are between May the 3d, and November the 17th.

Thus, from the Number anſwering to November 17th. 321
Subtract that anſwering to May 3d. —— 123

The *Remainder* is the Number of Days ſought 198

Fourthly, To find the *Number* of *Days*, from any given *Day* of any *Month* in one *Year*, to any given *Day* of any *Month* in the *next Year*.

How many Days is it from the 20th of October 1756, to the 19th of March, 1757.

From the Days of the whole Year —— 365
Subtract the Number to October 20 —— 293

Remains the Number to the End of the Year 72
To which add the Number to the 19th of March 78

The *Sum* is the *Number* of Days required —— 150

And thus is the *Number* of *Days* readily found for any *Interval* of *Time* given, in the ſame Year; or which is part of one, and part of another Year. But it muſt be obſerved in *Leap Year*, that if one of the given Days (between which the Number of days is required) is before the 29th of February and the other after, to add one day more on that account: Thus if the Number of days required, inſtead of being from the 20th of October 1756, to the 19th of March 1757 (as in the laſt Example) had been from the 20th of October 1755 to the 19th of March 1756, it would have been 151 Days.

DECIMAL TABLES

OF

SIMPLE INTEREST.

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TABLE I. *Simple Intereſt for* Days *at* 5 per Cent.

ays	1*l.*	2*l.*	3*l.*	4*l.*	5*l.*	6*l.*	7*l.*	8*l.*	9*l.*
1	.000137	.000274	.000411	.000548	.000685	.000822	.000959	.001096	.001233
2	.000274	.000548	.000822	.001096	.001370	.001644	.001918	.002192	002466
3	.000411	.000822	.001233	.001644	.002055	.002466	.002877	.003288	.003699
4	.000548	.001096	.001644	.002192	.002740	.003288	.003836	.004384	.004931
5	.000685	.001370	.002055	.002740	.003425	.004110	.004794	.005479	.006164
6	.000822	.001644	.002466	.003288	.004110	.004931	.005753	.006575	.007397
7	.000959	.001918	.002877	.003836	.004794	.005753	.006712	.007671	.008630
8	.001096	.002192	.003288	.004384	.005479	.006575	.007671	.008767	.009863
9	.001233	.002466	.003699	.004931	.006164	.007397	.008630	.009863	.011096
10	.001370	.002740	.004110	.005479	.006849	.008219	.009589	.010959	.012329
11	.001507	.003014	.004521	.006027	.007534	.009041	.010548	.012055	.013562
12	.001644	.003288	.004931	.006575	.008219	.009863	.011507	.013151	.014794
13	.001781	.003562	.005342	.007123	.008904	.010685	.012466	.014247	.016027
14	.001918	.003836	.005753	.007671	.009589	.011507	.013425	.015342	.017260
15	.002055	.004110	.006164	.008219	.010274	.012329	.014384	.016438	.018493
16	.002192	.004384	.006575	.008767	.010959	.013151	.015342	.017534	.019726
17	.002329	.004657	.006986	.009315	.011644	.013973	.016301	.018630	.020959
18	.002466	.004931	.007397	.009863	012329	.014794	.017260	.019726	.022192
19	.002603	.005205	.007808	010411	.013014	.015616	.018219	.020822	.023425
20	.002740	.005479	.008219	.010959	.013699	.016438	019178	.021918	.024657
21	.002877	.005753	.008630	.011507	014384	.017260	.020137	.023014	.025890
22	.003014	.006027	.009041	.012055	.015068	.018082	.021096	.024110	.027123
23	.003151	.006301	.009452	.012603	.015753	.018904	.022055	.025205	.028356
24	.003288	.006575	.009863	.013151	.016438	.019726	.023014	.026301	.029589
25	.003425	.006849	.010274	.013699	.017123	.020548	.023973	.027397	.030822
26	.003562	.007123	.010685	.014247	.017808	.021370	.024931	.028493	.032055
27	003699	.007397	.011096	.014794	.018493	.022192	.025890	.029589	.033288
28	003836	.007671	.011507	.015342	.019178	.023014	.026849	.030685	.034521
29	.003973	.007945	.011918	.015890	.019863	.023836	.027808	.031781	.035753
30	.004110	.008219	.012329	.016438	.020548	.024657	.028767	.032877	.036986
31	.004247	.008493	.012740	.016986	.021233	.025479	.029726	.033973	.038219
32	.004384	.008767	013151	.017534	.021918	.026301	.030685	.035068	.039452
33	004521	.009041	013562	.018082	.022603	027123	.031644	.036164	.040685
34	.004657	.009315	.013973	.018630	.023288	.027945	.032603	.037260	.041918
35	.004794	.009589	.014384	.019178	.023973	.028767	.033562	.038356	.043151
36	.004931	.009863	.014794	.019726	.024657	.029589	.034521	.039452	.044384
37	.005068	.010137	015205	.020274	.025342	.030411	.035479	.040548	.0456 6
38	.005205	.010411	015616	.020822	.026027	.031233	.036438	.041644	.046849
39	.005342	.010685	.016027	.021370	.026712	.032055	.037397	.042740	.048082
40	.005479	.010959	.016438	.021918	.027397	.032877	.038356	.043836	.049315
41	.005616	.011233	.016849	.022466	.028082	.033699	.039315	.044931	.050548
42	.005753	.011507	.017260	.023014	.028767	.034521	.040274	.046027	.051781
43	.005890	.011781	.017671	.023562	.029452	.035342	.041233	.047123	.053014
44	006027	012055	.018082	.024110	.030137	036164	.042192	.048219	.054247
45	006164	.012329	018493	024657	.030822	.036986	.043151	.049315	.055479
46	.006301	.012603	.018904	.025205	.031507	.037808	044110	.050411	.056712
47	.006438	.012877	019315	.025753	.032192	.038630	.045068	051507	.057945
48	006575	.013151	.019726	.026301	.032877	.039452	.046027	.052603	.059178
49	.006712	013425	.020137	.026849	.033562	.040274	.046986	.053699	.060411
50	.006849	.013699	020548	.027397	.034247	.041096	.047945	054794	.061644
51	.006986	.013973	020959	.027945	.034931	.041918	.048904	.055890	.062877
52	007123	014247	.021370	.0 8493	.035616	.042740	.049863	.056986	.064110

Days	1*l.*	2*l.*	3*l.*	4*l.*	5*l.*	6*l.*	7*l.*	8*l.*	9*l.*
53	.007260	.014521	.021781	.029041	.036301	.043562	.050822	.058082	.065342
54	.007397	.014794	.022192	.029589	.036986	.044384	.051781	.059178	.066575
55	.007534	.015068	.022603	.030137	.037671	.045205	.052740	.060274	.067808
56	.007671	015342	.023014	.030685	.038356	.046027	.053699	.061370	.069041
57	.007808	.015616	.023425	.031233	.039041	.046849	.054657	.062466	.070274
58	.007945	015890	.023836	.031781	.039726	.047671	.055616	.063562	.071507
59	.008082	.016164	.024247	.032329	.040411	.048493	.056575	.064657	.072740
60	.008219	.016438	.024657	.032877	.041096	.049315	.057534	.065753	.073973
61	.008356	.016712	.025068	.033425	.041781	.050137	.058493	066849	.075205
62	.008493	.016986	.025479	.033973	.042466	.050959	.059452	.067945	.076438
63	.008630	.017260	.025890	.034521	.043151	.051781	.060411	.069041	.077671
64	.008767	.017534	.026301	.035068	.043836	.052603	.061370	.070137	078904
65	.008904	.017808	.026712	.035616	.044521	.053425	.062329	.071233	.080137
66	.009041	.018082	.027123	.036164	.045205	.054247	.063288	.072329	.081370
67	.009178	.018356	.027534	.036712	.045890	.055068	.064247	.073425	.082603
68	.009315	.018630	.027945	.037260	.046575	.055890	.065205	.074521	.083836
69	.009452	.018904	.028356	.037808	.047260	.056712	.066164	.075616	.085068
70	.009589	.019178	.028767	.038356	.047945	.057534	.067123	.076712	.086301
71	.009726	.019452	.029178	.038904	.048630	.058356	.068082	.077808	.087534
72	.009863	.019726	.029589	.039452	.049315	.059178	.069041	.078904	.088767
73	.010000	.020000	.030000	.040000	.050000	.060000	.070000	.080000	.090000
74	.010137	020274	.030411	.040548	.050685	.060822	.070959	.081096	.091233
75	.010274	.020548	.030822	.041096	.051370	.061644	071918	.082192	.092466
76	.010411	020822	.031233	.041644	.052055	.062466	.072877	.083288	.093699
77	.010548	.021096	.031644	.042192	.052740	.063288	.073836	.084384	.094931
78	.010685	.021370	.032055	.042740	.053425	.064110	.074794	.085479	.096164
79	.010822	.021644	.032466	.043288	.054110	.064931	.075753	.086575	.097397
80	.010959	.021918	.032877	.043836	.054794	.065753	.076712	.087671	.098630
81	.011096	.022192	.033288	.044384	.055479	.066575	.077671	.088767	.099863
82	.011233	.022466	.033699	.044931	.056164	.067397	.078630	.089863	.101096
83	.011370	.022740	.034110	.045479	.056849	.068219	.079589	090959	.102329
84	.011507	.023014	.034521	.046027	.057534	.069041	.080548	.092055	.103562
85	.011644	.023288	.034931	.046575	.058219	.069863	.081507	.093151	.104794
86	.011781	.023562	.035342	.047123	.058904	.070685	.082466	.094247	.106027
87	.011918	.023836	.035753	.047671	.059589	.071507	.083425	.095342	.107260
88	.012055	.024110	.036164	.048219	.060274	.072329	.084384	096438	.108493
89	.012192	.024384	.036575	.048767	.060959	.073151	.085342	.097534	.109726
90	.012329	.024657	.036986	.049315	.061644	073973	.086301	.098630	.110959
91	.012466	.024931	.037397	.049863	.062329	.074794	.087260	.099726	.112192
92	.012603	.025205	.037808	.050411	.063014	.075616	.088219	.100822	.113425
93	.012740	.025479	.038219	.050959	.063699	.076438	.089178	.101918	.114657
94	.012877	025753	038630	.051507	.064384	.077260	.090137	.103014	.115890
95	.013014	026027	.039041	.052055	.065068	.078082	.091096	.104110	.117123
96	013151	.026301	.039452	.052603	.065753	.078904	.092055	.105205	.118356
97	.013288	.026575	.039863	.053151	.066438	.079726	.093014	.106301	.119589
98	.013425	026849	.040274	.053699	.067123	080548	.093973	.107397	.120822
99	.013562	.027123	.040685	.054247	.067808	.081370	.094931	.108493	.122055
100	.013699	027397	.041096	.054794	.068493	.082192	.095890	.109589	.123288
101	.013836	.027671	041507	.055342	.069178	.083014	.096849	.110685	.124521
102	013973	.027945	.041918	.055890	.069863	.083836	.097808	.111781	.125753
103	.014110	.028219	.042329	056438	.070548	.084657	.098767	.112877	.126986
104	014247	028493	.042740	.056986	.071233	.085479	.099726	.113973	.128219
105	.014384	.028767	.043151	.057534	.071918	.086301	.100685	.115068	.129452
106	.014521	.029041	.043562	.058082	.072603	.087123	.101644	.116164	.130685
107	014657	029315	.043973	.058630	.073288	.087945	.102603	.117260	.131918

Days	1*l.*	2*l.*	3*l.*	4*l.*	5*l.*	6*l.*	7*l.*	8*l.*	9*l.*
108	.014794	.029589	.044384	.059178	.073973	.088767	.103562	.118356	.133151
109	.014931	.029863	.044794	.059726	.074657	.089589	.104521	.119452	.134384
110	.015068	.030137	.045205	.060274	.075342	090411	.105479	.120548	.135616
111	.015205	.030411	.045616	.060822	.076027	091233	.106438	.121644	.136849
112	.015342	.030685	.046027	.061370	.076712	.092055	.107397	.122740	.138082
113	.015479	.030959	.046438	.061918	.077397	092877	.108356	.123836	.139315
114	.015616	.031233	.046849	.062466	.078082	.093699	.109315	.124931	.140548
115	.015753	.031507	.047260	.063014	.078767	.094521	.110274	.126027	.141781
116	015890	.031781	.047671	063562	.079452	095342	.111233	.127123	.143014
117	.016027	.032055	.048082	.064110	.080137	096164	.112192	.128219	.144247
118	.016164	.032329	.048493	.064657	.080822	096986	.113151	.129315	.145479
119	.016301	032603	.048904	.065205	.081507	097808	.114110	.130411	.146712
120	.016438	.032877	.049315	.065753	.082192	098630	.115068	.131507	.147945
121	.016575	.033151	.049726	.066301	.082877	099452	.116027	.132603	.149178
122	.016712	.033425	.050137	.066849	.083562	.100274	.116986	.133699	.150411
123	.016849	.033699	.050548	.067397	.084247	.101096	.117945	.134794	.151644
124	.016986	033973	.050959	.067945	.084931	101918	.118904	.135890	.152877
125	.017123	.034247	.051370	.068493	.085616	.102740	.119863	.136986	.154110
126	.017260	034521	.051781	.069041	.086301	.103562	.120822	.138082	.155342
127	.017397	.034794	.052192	.069589	.086986	.104384	.121781	.139178	.156575
128	.017534	.035068	.052603	.070137	.087671	.105205	.122740	.140274	.157808
129	017671	.035342	.053014	.070685	.088356	.106027	.123699	.141370	.159041
130	.017808	.035616	.053425	.071233	.089041	.106849	.124657	.142466	.160274
131	.017945	.035890	.053836	.071781	.089726	.107671	.125616	.143562	.161507
132	018082	.036164	.054247	.072329	.090411	108493	.126575	.144657	.162740
133	.018219	.036438	.054657	.072877	.091096	.109315	.127534	.145753	.163973
134	.018356	.036712	055068	.073425	091781	.110137	.128493	.146849	.165205
135	.018493	.036986	055479	.073973	.092466	.110959	.129452	.147945	.166438
136	.018630	.037260	.055890	.074521	.093151	111781	.130411	.149041	.167671
137	.018767	.037534	.056301	.075068	.093836	.112603	.131370	.150137	.168904
138	.018904	.037808	.056712	.075616	.094521	.113425	.132329	.151233	.170137
139	.019041	.038082	.057123	.076164	.095205	.114247	.133288	.152329	.171370
140	.019178	.038356	.057534	.076712	.095890	.115068	.134247	.153425	.172603
141	.019315	.038630	.057945	.077260	.096575	.115890	.135205	.154521	.173836
142	.019452	.038904	.058356	.077808	.097260	.116712	.136164	.155616	.175068
143	.019589	.039178	.058767	.078356	.097945	.117534	.137123	.156712	.176301
144	.019726	.039452	.059178	.078904	.098630	.118356	.138082	.157808	.177534
145	.019863	.039726	.059589	.079452	.099315	.119178	.139041	.158904	.178767
146	.020000	.040000	.060000	.080000	.100000	.120000	.140000	.160000	.180000
147	.020137	.040274	.060411	.080548	.100685	.120822	.140959	.161096	.181233
148	.020274	.040548	.060822	.081096	.101370	.121644	.141918	.162192	.182466
149	.020411	.040822	.061233	.081644	.102055	.122466	.142877	.163288	.183699
150	.020548	.041096	.061644	.082192	.102740	.123288	.143836	.164384	.184931
151	.020685	.041370	.062055	.082740	.103425	.124110	.144794	.165479	.186164
152	.020822	.041644	.062466	.083288	.104110	.124931	.145753	.166575	.187397
153	.020959	.041918	.062877	.083836	.104794	.125753	.146712	.167671	.188630
154	.021096	.042192	.063288	.084384	.105479	.126575	.147671	.168767	.189863
155	.021233	.042466	.063699	084931	.106164	.127397	.148630	.169863	.191096
156	.021370	.042740	.064110	.085479	.106849	.128219	.149589	.170959	192329
157	.021507	,043014	064521	.086027	.107534	129041	.150548	.172055	.193562
158	.021644	.043288	.064931	.086575	.108219	.129863	.151507	.173151	.194794
159	.021781	.043562	.065342	.087123	.108904	.130685	.152466	.174247	.196027
160	.021918	.043836	.065753	.087671	.109589	.131507	.153425	.175342	.197260
161	.022055	.044110	.066164	.088219	.110274	.132329	.154384	.176438	.198493
162	.022192	.044384	.066575	088767	.110959	.133151	.155342	.177534	.199726

Days	1*l.*	2*l.*	3*l.*	4*l.*	5*l.*	6*l.*	7*l.*	8*l.*	9*l.*
163	.022329	.044657	.066986	.089315	.111644	.133973	.156301	.178630	.200959
164	.022466	.044931	.067397	.089863	.112329	.134794	.157260	.179726	.202192
165	.022603	.045205	.067808	.090411	.113014	.135616	.158219	.180822	.203425
166	.022740	.045479	.068219	.090959	.113699	.136438	.159178	.181918	.204657
167	.022877	.045753	.068630	.091507	.114384	.137260	.160137	.183014	.205890
168	.023014	.046027	.069041	.092055	.115068	.138082	.161096	.184110	.207123
169	.023151	.046301	.069452	.092603	.115753	.138904	.162055	.185205	.208356
170	.023288	.046575	.069863	.093151	.116438	.139726	.163014	.186301	.209589
171	.023425	.046849	.070274	.093699	.117123	.140548	.163973	.187397	.210822
172	.023562	.047123	.070685	.094247	.117808	.141370	.164931	.188493	.212055
173	.023699	.047397	.071096	.094794	.118493	.142192	.165890	.189589	.213288
174	.023836	.047671	.071507	.095342	.119178	.143014	.166849	.190685	.214521
175	.023973	.047945	.071918	.095890	.119863	.143836	.167808	.191781	.215753
176	.024110	.048219	.072329	.096438	.120548	.144657	.168767	.192877	.216986
177	.024247	.048493	.072740	.096986	.121233	.145479	.169726	.193973	.218219
178	.024384	.048767	.073151	.097534	.121918	.146301	.170685	.195068	.219452
179	.024521	.049041	.073562	.098082	.122603	.147123	.171644	.196164	.220685
180	.024657	.049315	.073973	.098630	.123288	.147945	.172603	.197260	.221918
181	.024794	.049589	.074384	.099178	.123973	.148767	.173562	.198356	.223151
182	.024931	.049863	.074794	.099726	.124657	.149589	.174521	.199452	.224384
183	.025068	.050137	.075205	.100274	.125342	.150411	.175479	.200548	.225616
184	.025205	.050411	.075616	.100822	.126027	.151233	.176438	.201644	.226849
185	.025342	.050685	.076027	.101370	.126712	.152055	.177397	.202740	.228082
186	.025479	.050959	.076438	.101918	.127397	.152877	.178356	.203836	.229315
187	.025616	.051233	.076849	.102466	.128082	.153699	.179315	.204931	.230548
188	.025753	.051507	.077260	103014	.128767	.154521	.180274	.206027	.231781
189	.025890	.051781	.077671	.103562	.129452	.155342	.181233	.207123	.233014
190	.026027	.052055	.078082	.104110	.130137	.156164	.182192	.208219	.234247
191	.026164	.052329	.078493	.104657	.130822	.156986	.183151	.209315	.235479
192	.026301	.052603	.078904	.105205	.131507	.157808	.184110	.210411	.236712
193	.026438	.052877	.079315	.105753	.132192	.158630	.185068	.211507	.237945
194	.026575	.053151	.079726	.106301	.132877	.159452	.186027	.212603	.239178
195	.026712	.053425	.080137	.106849	.133562	.160274	.186986	.213699	.240411
196	.026849	.053699	.080548	.107397	.134247	.161096	.187945	.214794	.241644
197	.026986	.053973	.080959	.107945	.134931	.161918	.188904	.215890	.242877
198	.027123	.054247	.081370	.108493	.135616	.162740	.189863	.216986	.244110
199	.027260	.054521	.081781	.109041	.136301	.163562	.190822	.218082	.245342
200	.027397	.054794	.082192	.109589	.136986	.164384	.191781	.219178	.246575
201	.027534	.055068	.082603	.110137	.137671	.165205	.192740	.220274	.247808
202	.027671	.055342	.083014	.110685	.138356	.166027	.193699	.221370	.249041
203	.027808	.055616	.083425	.111233	.139041	.166849	.194657	.222466	.250274
204	.027945	.055890	.083836	.111781	.139726	.167671	.195616	.223562	.251507
205	.028082	.056164	.084247	.112329	.140411	.168493	.196575	.224657	.252740
206	.028219	.056438	.084657	.112877	.141096	.169315	.197534	.225753	.253973
207	.028356	.056712	.085068	.113425	.141781	.170137	.198493	.226849	.255205
208	.028493	.056986	.085479	.113973	.142466	.170959	.199452	.227945	.256438
209	.028630	.057260	.085890	.114521	.143151	.171781	.200411	.229041	.257671
210	.028767	.057534	.086301	.115068	.143836	.172603	.201370	.230137	.258904
211	.028904	.057808	.086712	.115616	.144521	.173425	.202329	.231233	.260137
212	.029041	.058082	.087123	.116164	.145205	.174247	.203288	.232329	.261370
213	.029178	.058356	.087534	.116712	.145890	.175068	.204247	.233425	.262603
214	.029315	.058630	.087945	.117260	.146575	.175890	.205205	.234521	.263836
215	.029452	.058904	.088356	.117808	.147260	.176712	.206164	.235616	.265068
216	.029589	.059178	.088767	.118356	.147945	.177534	.207123	.236712	.266301
217	.029726	.059452	.089178	.118904	.148630	.178356	.208082	.237808	.267534

Days	1*l.*	2*l.*	3*l.*	4*l.*	5*l.*	6*l.*	7*l.*	8*l.*	9*l.*
218	.029863	.059726	.089589	.119452	.149315	.179178	.209041	.238904	.268767
219	.030000	.060000	.090000	.120000	.150000	.180000	.210000	.240000	.270000
220	.030137	.060274	.090411	.120548	.150685	.180822	.210959	.241096	.271233
221	.030274	.060548	.090822	.121096	.151370	.181644	.211918	.242192	.272466
221	.030411	.060822	.091233	.121644	.152055	.182466	.212877	.243288	.273699
223	.030548	.061096	.091644	.122192	.152740	.183288	.213836	.244384	.274931
224	.030685	.061370	.092055	.122740	.153425	.184110	.214794	.245479	.276164
225	.030822	.061644	.092466	.123288	.154110	.184931	.215753	.246575	.277397
226	.030959	.061918	.092877	.123836	.154794	.185753	.216712	.247671	.278630
227	.031096	.062192	.093288	.124384	.155479	186575	.217671	.248767	279863
228	.031233	.062466	.093699	.124931	.156164	.187397	.218630	.249863	.281096
229	.031370	062740	.094110	.125479	.156849	.188219	.219589	.250959	.282329
230	031507	.063014	094521	.126027	157534	.189041	.220548	.252055	.283562
231	.031644	063288	.094931	.126575	.158219	.189863	.221507	253151	.284794
231	.031781	063562	.095342	.127123	.158904	.190685	.222466	.254247	.286027
233	.031918	063836	095753	.127671	.159589	.191507	.223425	.255342	.287260
234	.032055	.064110	.096164	.128219	160274	.192329	.224384	.256438	.288493
235	.032192	.064384	.096575	.128767	.160959	193151	.225342	.257534	.289726
236	032329	.064657	.096986	.129315	.161644	.193973	.226301	.258630	.290959
237	.032466	.064931	.097397	.129863	.162329	.194794	.227260	259726	.292192
238	.032603	.065205	.097808	.130411	.163014	.195616	.228219	260822	.293425
239	.032740	.065479	.098219	.130959	.163699	.196438	.229178	.261918	.294657
240	.032877	.065753	.098630	.131507	.164384	197260	.230137	263014	.295890
241	033014	.066027	099041	.132055	.165068	198082	.231096	.264110	.297123
242	.033151	.066301	.099452	.132603	.165753	.198904	.232055	.265205	.298356
243	.033288	.066575	.099863	.133151	.166438	199726	.233014	.266301	.299589
244	033425	.066849	100274	.133699	.167123	.200548	.233973	.267397	300822
245	.033562	.067123	100685	.134247	167808	.201370	.234931	.268493	.302055
246	.033699	067397	.101096	.134794	.168493	.202192	.235890	.269589	.303288
247	033836	067671	.101507	.135342	.169178	.203014	.236849	.270685	.304521
248	.033973	.067945	.101918	.135890	.169863	203836	.237808	.271781	305753
249	.034110	.068219	.102329	.136438	170548	.204657	.238767	.272877	.306986
250	.034247	.068493	.102740	.136986	.171233	.205479	.239726	.273973	308219
251	.034384	.068767	.103151	.137534	.171918	.206301	.240685	.275068	309452
252	.034521	.069041	.103562	.138082	.172603	.207123	.241644	.276164	.310685
253	.034657	.069315	.103973	.138630	.173288	.207945	.242603	.277260	311918
254	.034794	. 69589	.104384	.139178	.173973	.208767	.243562	.278356	.313151
255	.034931	.069863	.104794	.139726	.174657	.209589	.244521	.279452	314384
256	.035068	.070137	.105205	.140274	.175342	.210411	.245479	.280548	.315616
257	.035205	.070411	.105616	.140822	176027	.211233	.246438	281644	.316849
258	.035342	.070685	.106027	.141370	.176712	.212055	.247397	.282740	.318082
259	.035479	.070959	.106438	.141918	.177397	.212877	.248356	.283836	.319315
260	.035616	.071233	.106849	142466	.178082	.213699	.249315	.284931	.320548
261	.035753	.071507	.107260	.143014	.178767	214521	.250274	.286027	321781
262	.035890	.071781	.107671	.143562	.179452	.215342	.251233	.287123	.323014
263	.036027	.072055	.108082	.144110	.180137	216164	.252192	.288219	.324247
264	.036164	.072329	.108493	.144657	.180822	.216986	.253151	.289315	.325479
265	.036301	.072603	.108904	.145205	.181507	.217808	.254110	.290411	.326712
266	.036438	.072877	.109315	.145753	.182192	218630	.255068	.291507	.327945
267	.036575	.073151	.109726	.146301	.182877	219452	.256027	.292603	.329178
268	.036712	.073425	.110137	.146849	.183562	220271	.256986	.293699	.330411
269	.036849	.073699	.110548	.147397	.184247	.221096	.257945	294794	331644
270	.036986	.073973	.110959	.147945	.184931	.221918	.258904	295890	.332877
271	.037123	.074247	.111370	.148493	.185616	222740	.259863	296986	.334110
272	.037260	.074521	.111781	.149041	.186301	.223562	.260822	.298082	.335342

A Decimal Table of Simple Intereſt for Days *at* 5 per Cent.

Days	1*l.*	2*l.*	3*l.*	4*l.*	5*l.*	6.	7*l.*	8*l.*	9*l.*
273	.037397	.074794	.112192	.149589	.186986	.224384	.261781	.299178	.336575
274	.037534	.075068	.112603	.150137	.187671	.225205	.262740	.300274	.337808
275	037671	.075342	.113014	.150685	.188356	.226027	.263699	.301370	.339041
276	037808	.075616	.113425	.151233	.189041	.226849	.264657	.302466	.340274
277	.037945	.075890	.113836	.151781	.189726	.227671	.265616	.303562	.341507
278	.038082	.076164	.114247	.152329	.190411	.228493	.266575	.304657	.342740
279	.038219	076438	.114657	.152877	.191046	.229315	.267534	.305753	.343973
280	.038356	.076712	.115068	.153425	.191781	.230137	.268493	.306849	.345205
281	.038493	.076986	.115479	.153973	.192466	.230959	.269452	.307945	.346438
282	.038630	.077260	.115890	.154521	.193151	.231781	.270411	.309041	.347671
283	.038767	.077534	.116301	155068	193836	.232603	.271370	.310137	.348904
284	.038904	.077808	.116712	.155616	.194521	.233425	.272329	.311233	.350137
285	.039041	.078082	.117123	.156164	.195205	.234247	.273288	.312329	.351370
286	.039178	078356	.117534	.156712	.195890	.235068	.274247	.313425	352603
287	.039315	078630	.117945	.157260	.196575	.235890	.275205	.314521	.353836
288	.039452	.078904	.118356	.157808	.197260	.236712	.276164	.315616	.355068
289	.039589	.079178	.118767	.158356	.197945	.237534	.277123	.316712	.356301
290	.039726	079452	.119178	.158904	.198630	.238356	.278082	.317808	.357534
291	.039863	.079726	.119589	.159452	.199315	.239178	.279041	.318904	.358767
292	.040000	.080000	.120000	.160000	.200000	.240000	.280000	.320000	.360000
293	.040137	.080274	.120411	.160548	.200685	.240822	.280959	.321096	.361233
294	040274	.080548	.120822	.161096	.201370	.241644	.281918	.322192	362466
295	.040411	080822	.121233	.161644	.202055	.242466	.282877	.323288	.363699
296	.040548	.081096	.121644	.162192	.202740	.243288	.283836	.324384	.364931
297	.040685	.081370	.122055	.162740	.203425	.244110	.284794	.325479	.366164
298	040822	.081644	.122466	.163288	.204110	.244931	.285753	.326575	.367397
299	.040959	.081918	.122877	.163836	.204794	.245753	.286712	.327671	.368630
300	.041096	.082192	.123288	.164384	.205479	.246575	.287671	.328767	.369863
301	.041233	.082466	.123699	.164931	.206164	.247397	.288630	.329863	.371096
392	.041370	.082740	.124110	165479	206849	.248219	.289589	.330959	.372329
303	041507	.083014	.124521	.166027	.207534	.249041	.290548	.332055	.373562
304	.041644	.083288	.124931	.166575	.208219	.249863	.291507	.333151	.374794
305	.041781	.083562	.125342	.167123	.208904	.250685	.292466	.334247	.376027
306	041918	.083836	.125753	.167071	209589	.251507	.293425	.335342	.377260
307	.042055	.084110	.126164	.168219	.210274	.252329	.294384	.336438	.378493
308	.042192	.084384	.126575	.168767	.210959	.253151	.295342	.337534	.379726
309	.042329	.084657	.126986	.169315	.211644	.253973	.296301	.338630	.380959
310	.042466	.084931	127397	.169863	.212329	.254794	.297260	.339726	.382192
311	.042603	.085205	.127808	.170411	.213014	.255616	.298219	.340822	.383425
312	042740	.085479	.128219	.170959	.213699	.256438	.299178	.341918	.384657
313	042877	.085753	.128630	.171507	.214384	.257260	.300137	.343014	.385890
314	.043014	.086027	.129041	.172055	.215068	.258082	301096	344110	.387123
315	.043151	086301	.129452	172603	.215753	.258904	.302055	.345205	.388356
316	.043288	.086575	.129863	.173151	.216438	.259726	.303014	.346301	.389589
317	.043425	.086849	.130274	.173699	.217123	.260548	.303973	.347397	.390822
318	.043562	.087123	.130685	.174247	.217808	.261370	.304931	.348493	.392055
319	.043699	.087397	.131096	.174794	.218493	.262192	.305890	.349589	.393288
320	.043836	087671	.131507	.175342	.219178	.263014	.306849	.350685	.394521
321	.043973	087945	.131918	.175890	.219863	.263836	.307808	.351781	.395753
322	.044110	.088219	.132329	.176438	.220548	.264657	.308767	.352877	.396986
323	.044247	088493	.132740	.176986	.221233	.265479	.309726	.353973	.398219
324	.044384	088767	.133151	.177534	221918	266301	.310685	.355068	399452
325	.044521	.089041	.133562	.178082	222603	267123	.311641	.356164	.400685
326	.044657	.089315	.133973	.178630	.223288	.267945	.312603	.357260	.401918
327	.044794	.089589	.134384	.179178	.223973	.268767	313562	.358356	.403151

Days	1*l.*	2*l.*	3*l.*	4*l.*	5*l.*	6*l.*	7*l.*	8*l.*	9*l.*
328	.044931	.089863	.134794	.179726	.224657	.269589	.314521	.359452	.404384
329	045068	.090137	.135205	.180274	.225342	.270411	.315479	.360548	.405616
330	.045205	.090411	.135616	.180822	.226027	.271233	.316438	.361644	.406849
331	.045342	.090685	.136027	.181370	.226712	.272055	.317397	.362740	.408082
332	.045479	.090959	.136438	.181918	.227397	.272877	.318356	.363836	.409315
333	.045616	.091233	.136849	.182466	.228082	.273699	.319315	.364931	.410548
334	.045753	.091507	.137260	.183014	.228767	.274521	.320274	.366027	.411781
335	.045890	.091781	.137671	.183562	.229452	.275342	.321233	.367123	.413014
336	.046027	.092055	.138082	.184110	.230137	.276164	.322192	.368219	.414247
337	.046164	.092329	.138493	.184657	.230822	.276986	.323151	.369315	.415479
338	.046301	.092603	.138904	.185205	.231507	.277808	.324110	.370411	.416712
339	.046438	.092877	.139315	.185753	.232192	.278630	.325068	.371507	.417945
340	.046575	.093151	.139726	.186301	.232877	.279452	.326027	.372603	.419178
341	.046712	.093425	.140137	.186849	.233562	.280274	.326986	.373699	.420411
342	.046849	.093699	.140548	.187397	.234247	.281096	.327945	.374794	421644
343	.046986	.093973	.140959	.187945	.234931	.281918	.328904	.375890	.422877
344	.047123	.094247	.141370	.188493	.235616	.282740	.329863	.376986	.424110
345	.047260	.094521	.141781	.189041	.236301	.283562	.330822	.378082	.425342
346	.047397	.094794	.142192	.189589	.236986	.284384	.331781	.379178	.426575
347	.047534	.095068	.142603	.190137	.237671	.285205	.332740	.380274	.427808
348	.047671	.095342	.143014	.190685	.238356	.286027	.333699	.381370	.429041
349	.047808	.095616	.143425	.191233	.239041	.286849	.334657	.382466	.430274
350	.047945	.095890	.143836	.191781	.239726	.287671	.335616	.383562	.431507
351	048082	.096164	.144247	.192329	.240411	.288493	.336575	.384657	.432740
352	.048219	.096438	.144657	.192877	.241096	.289315	.337534	.385753	.433973
353	.048356	.096712	.145068	.193425	.241781	.290137	.338493	.386849	.435205
354	.048493	.096986	.145479	.193973	.242466	.290959	.339452	.387945	.436438
355	.048630	.097260	.145890	.194521	.243151	.291781	.340411	.389041	.437671
356	.048767	.097534	.146301	.195068	.243836	.292603	.341370	390137	.438904
357	.048904	.097808	.146712	.195616	.244521	.293425	.342329	.391233	.440137
358	.049041	.098082	.147123	.196164	.245205	.294247	.343288	392329	.441370
359	.049178	.098356	.147534	.196712	.245890	.295068	.344247	.393425	.442603
360	.049315	.098630	.147945	.197260	.246575	.295890	.345295	.394521	.443836
361	.049452	.098904	.148356	.197808	.247260	.296712	.346164	395616	.445068
362	.049589	.099178	.148767	.198356	.247945	.297534	.347123	.396712	.446301
363	.049726	.099452	.149178	.198904	.248630	.298356	.348082	.397808	447534
364	.049863	.099726	.149589	.199452	.249315	.299178	.349041	.398904	.448767
365	.050000	.100000	.150000	.200000	.250000	.300000	.350000	.400000	.450000
Mon.	.004167	008333	.012500	.016667	.020833	.025000	.029167	.033333	.037500

TABLE 2. *Simple Intereſt for* Years *at* 5 per Cent.

Y.	1 *l.*	2 *l.*	3 *l.*	4 *l.*	5 *l*	6 *l.*	7 *l.*	8 *l.*	9 *l.*
1	0,050	0.100	0.150	0.200	0.250	0.300	0.350	0.400	0.450
2	0.100	0.200	0.300	0.400	0.500	0.600	0.700	0.800	0.900
3	0.150	0.300	0.450	0.600	0.750	0.900	1.050	1.200	1.350
4	0.200	0.400	0.600	0.800	1.000	1.200	1.400	1.600	1.800
5	0.250	0.500	0.750	1.000	1.250	1.500	1.750	2.000	2.250
6	0.300	0.600	0.900	1.200	1.500	1.800	2.100	2.400	2.700
7	0.350	0.700	1.050	1.400	1.750	2.100	2.450	2.800	3.150
8	0.400	0.800	1.200	1.600	2.000	2.400	2.800	3.200	3.600
9	0.450	0.900	1.350	1.800	2.250	2.700	3.150	3.600	4.050
10	0.500	1.000	1.500	2.000	2.500	3.000	3.500	4.000	4.500
11	0.550	1.100	1.650	2.200	2.750	3.300	3.850	4.400	4.950
12	0.600	1.200	1.800	2.400	3.000	3.600	4.200	4.800	5.400
13	0.650	1.300	1.950	2.600	3.250	3.900	4.550	5.200	5.850
14	0.700	1.400	2.100	2.800	3.500	4.200	4.900	5.600	6.300
15	0.750	1.500	2.250	3.000	3.750	4.500	5.250	6.000	6.750
16	0.800	1.600	2.400	3.200	4.000	4.800	5.600	6.400	7.200
17	0.850	1.700	2.550	3.400	4.250	5.100	5.950	6.800	7.650
18	0.900	1.800	2.700	3.600	4.500	5.400	6.300	7.200	8.100
19	0.950	1.900	2.850	3.800	4.750	5.700	6.650	7.600	8.550
20	1.000	2.000	3.000	4.000	5.000	6.000	7.000	8.000	9.000
21	1.050	2.100	3.150	4.200	5.250	6.300	7.350	8.400	9.450
22	1.100	2.200	3.300	4.400	5.500	6.600	7.700	8.800	9.900
23	1.150	2.300	3.450	4.600	5,750	6.900	8.050	9.200	10.350
24	1.200	2.400	3.600	4.800	6.000	7.200	8.400	9.600	10.800
25	1.250	2.500	3.750	5.000	6.250	7.500	8.750	10.000	11.250
26	1.300	2.600	3.900	5.200	6.500	7.800	9.100	10.400	11.700
27	1.350	2.700	4.050	5.400	6.750	8.100	9.450	10.800	12.150
28	1.400	2.800	4.200	5.600	7.000	8.400	9.800	11.200	12.600
29	1.450	2.900	4.350	5.800	7.250	8.700	10.150	11.600	13.050
30	1.500	3.000	4.500	6.000	7.500	9.000	10.500	12.000	13.500
31	1.550	3.100	4.650	6.200	7.750	9.300	10.850	12.400	13.950
32	1.600	3.200	4.800	6.400	8.000	9.600	11.200	12.800	14.400
33	1.650	3.300	4.950	6.600	8.250	9.900	11.550	13.200	14.850
34	1.700	3.400	5.100	6.800	8.500	10.200	11.900	13.600	15.300
35	1.750	3.500	5.250	7.000	8.750	10.500	12.250	14.000	15.750
36	1.800	3.600	5.400	7.200	9.000	10.800	12.600	14.400	16.200
37	1.850	3.700	5.550	7.400	9.250	11.100	12.950	14.800	16.650
38	1.900	3.800	5.700	7.600	9.500	11.400	13.300	15.200	17.100
39	1.950	3.900	5.850	7.800	9.750	11.700	13.050	15.600	17.550
40	2.000	4.000	6.000	8.000	10.000	12.000	14.000	16.000	18.000

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SECT. II.

Compound Interest, Annuities, &c.

What *Compound Intereſt* is, has been already defined. And *Annuities*, *Penſions*, *Salaries*, &c. are *Rents*, *Profits*, and *Payments*, made *Yearly*, or *half-yearly*, &c. And they are ſaid to be in *Arrears*, when they are due and unpaid for any Number of Payments.

In order to ſolve Queſtions in *Compound Intereſt* and *Annuites* by *Tables*, I have hereafter inſerted 6 *Tables* of *Compound Intereſt* for that Purpoſe, the Nature of which may be ſeen by the Titles of them; I ſhall therefore begin with their *Conſtruction.*

As to the *Conſtruction* of the *ſecond* Table, which ſhews the *Amount* of 1*l.* for *Years*, at the *Rates* therein mentioned, (as the *firſt* Table does for *Days)* I need only refer the Reader to the 2nd *Example* in the 1ſt *Caſe* of *Compound Intereſt*, (Page 122) where the *Amount* of 1*l.* at 4 *per Cent.* is found for 1, 2, and 3 Years; and after the ſame manner, the *Amount* of 1*l.* is found as in the Table, from 1 Year to 40, at each *Rate* therein.

The *Conſtruction* of the *firſt* Table is *analogous* to the *ſecond*, for as the *ſecond* is conſtructed by continually multiplying by the *Amount* of 1*l* for a Year, ſo the *firſt* Table is conſtructed by continually multiplying by the *Amount of* 1*l. for a Day.* And the *Amount* of 1*l.* for a Day, is the *Root* of the Amount of 1*l.* for a Year extracted to the 365th *Power*, which here muſt be taken for granted to be as expreſſed in the Table, where you will find the *Amount* of 1*l.* for a *Day* at 5 *per Cent.* to be, 1.0001336,

and 1.0001336 the Amount of 1*l.* for 1 Day,
multipled by 1.0001336

Product 1.0002673 the Amount of 1*l.* for 2 Days.

And 1.0002673 the Amount of 1 *l.* for 2 Days.
mult. 1.0001336

Product 1.0004011 the Amount of 1 *l.* for 3 Days.
mult. 1.0001336

Product 1.0005348 the Amount of 1 *l.* for 4 Days.

And thus by continually multiplying by the *Amount of* 1 *l. for a Day*, at each *Rate per Cent.* the 1ſt Table is conſtructed; and the 364th *Product* will be the *Amount* of 1 *l.* for a *Year.*

The 3d *Table* is conſtructed by dividing *Unity* by the *Numbers* in the 2nd *Table*; the reſpective *Quotients* are the *Numbers* in the 3d.

The Reaſon of which is evident from the 2nd *Caſe* of *Compound Intereſt.* To make this appear, let the preſent Worth of 1 *l.* be required, due 1 Year hence at 5 *per Cent.* Here 1 *l.* is to be conſidered as the *given Amount*, and therefore by the 2nd *Rule* of the abovementioned *Caſe* it will be.

As 1.05 *l.* ; 1 *l.* : : 1 *l.* : .9523809 the preſent Worth or Principal required.

Hence 'tis plain that the fourth Term, which is the *firſt* Number in the 3d *Table* under 5 *per Cent.* is the Reſult of Unity divided by 1.05, which is the *firſt* Number in the 2nd *Table* under the ſame *Rate.*

In like manner in finding the preſent Worth of 1 *l.* for any Number of Years to 40 at 5 *per Cent*, the firſt Term in each Proportion will be the Number in *Table* 2. ſtanding againſt the ſaid Years, and under that *Rate*, and the ſecond and third Terms will always be Unity. And conſequently *Unity* being divided by each Number in the 2nd *Table* under any *Rate per Cent*, the reſpective *Quotients* will be the Numbers in the 3d *Table* under the ſame *Rate.*

Example at 5 per Cent.

	Table 2		Table 3.		
Unity, or 1 divided by	1.05	The Quot^{t}. is	.9523809	The preſent Value of 1 *l.* for	1
	1.1025		.9070295		2
	1.157625		.8638376		3
	1.2155063		.8227025		4
	1.2762816		.7835262		5 Years, &c

The 4th *Table* (which ſhews the *Amount* of 1*l.* *Annuity* for *Years*) may be conſtructed two or three ways, but the *Reaſon* of its Conſtruction, and the *Nature* of the *Amount of Annuities* when forborn or unpaid for any Number of Years, are I think eaſieſt conceived (except to an Algebraiſt) by the following Method, which is little more than an Application of the 1ſt *Caſe* of *Compound Intereſt.*

I'll here ſuppoſe the Amount of 1*l.* Annuity to be required for, 1, 2, 3, and ſo on for any Number of Years, at 5 *per Cent.*

Firſt, the Amount at the Expiration of 1 Year is the Annuity itſelf, namely 1*l*; and 1*l.* being put out at Intereſt for 1 Year at 5 *per Cent.* will amount to 1.05*l.* (by *Caſe* 1ſt, *Compound Intereſt*) to which add the Annuity, and it will be 1.05*l.* + 1 = 2.05*l.* the *Amount of* 1*l* *Annuity for* 2 *Years.*

Again, 2.05*l.* being put out at Intereſt for 1 Year at the ſame *Rate*, the Amount (by *Caſe* 1 as before) will be equal to 2.05×1.05=2.1525. And 2.1525 *l.* +1 (the Annuity)=3.1525 *l. the Amount of* 1*l. Annuity for* 3 *Years.*

Once more, the Amount of 3.1525*l.* for 1 Year at the ſaid *Rate*, will be equal to *l.* 3.1525×1.05=3.310125*l.* And 3.310125+1=4.310125*l.* *the Amount of* 1 *l. Annuity for* 4 *Years.*

The above Work may ſtand thus.

Table 4.

Firſt, the Annuity	=1.000000	The Amt. of 1*l* An-nuity for	1
and 1×1.05+1	=2.050000		2
next 2.05×1.05+1	=3.152500		3
laſtly 3.1525×1.05+1	=4.310125		4 Years, &c

And thus may the whole Table be conſtructed at every *Rate per Cent*, namely by continually multiplying by the Amount of 1*l.* for a Year, adding 1 to every Product.

I have already hinted at the Reaſon for ſhewing this Method of conſtructing the 4th *Table*, to wit, that the Learner may ſee the Nature of the Amount of annuities in Arrears, and the Reaſon of the Conſtruction; but a ſhorter Method of conſtructing the ſame is to add together the Numbers in the 2nd and 4th *Tables*, ſtanding againſt the ſame Years, and under the ſame *Rate* (as the firſt Number in each Column of *Table* 4, is always 1.) and the Sum of any two ſuch Numbers will be the next Number in *Table* 4.

Example at 5 per Cent.

Table 2.	Table 4.		
1.05	1.000000	The Amt. of 1*l* An-nuity for	1
1.1025	2.050000		2
1.157625	3.152500		3
1.2155063	4.310125		4 Years, &c.

Here the firſt Number in *Table* 4th, namely 1, added to 1.05, the firſt Number in *Table* 2nd, the Sum is 2.05, the ſecond Number in *Table* 4th, which ſecond Number 2.05 added to 1.1025 the ſecond Number in *Table* 2nd. the Sum is 3.1525 the third Number in *Table* 4th. And after this manner may the whole Table be conſtructed at each *Rate* therein.

The *Reaſon* of the *Conſtruction* of *Table* 5th, will beſt appear from the following Method of conſtructing it, namely, to divide the Numbers in the 4th *Table* by the Numbers in the 2nd, ſtanding againſt the ſame Years and under the ſame *Rate*, the Quotients will be the Numbers in the 5th.

Example at 5 per Cent.

Table 2.	Table 4.	Table 5.		
1.05)	1.000000(	=0.9523809	The Preſt. worth of 1*l*. Ann. for	1
1.1025)	2.050000(	=1.8594104		2
1.57625)	3.152500(	=2.7232480		3
1.2155063)	4.310125(	=3.5459505		4 Years, &c.

And thus for any other *Rate* of Intereſt.

This (as well as the Conſtruction of *Table* 3d) is deduced from the 2nd *Caſe* of *Compound Intereſt*, as will appear by conſidering firſt, that every Number in the 5th *Table*, is the preſent Worth or Principal of that Sum or Number in the 4th *Table* which ſtands againſt the ſame Years. Suppoſe therefore, that the preſent Worth of 2.05*l.* (the *ſecond* Number in the 4th *Table* under 5 *per Cent.*) be required for 2 Years at 5 *per Cent.* This by *Caſe.* 2 of *Compound Intereſt*, will be. As 1.1025*l.* : 1*l.* : : 2.05*l.* : 1.8594104*l.* which is the *ſecond* Number in *Table* 5 under that *Rate*. And as the *firſt* and *third* Terms in the Proportion are the *ſecond* Numbers in the 2nd and 4th *Tables*, it plainly appears that the foregoing Method of conſtructing the Table is deduced from the 2nd *Caſe of Compound Intereſt*.

But this alſo as well as *Table* 4, may be conſtructed by a ſhorter Method, for any Number in the 5th *Table*, added to the Number in the 3d, ſtanding againſt the next Year (and under the ſame *Rate*) the Sum is the next Number in the 5th *Table* (the firſt Number of each Column in *Table* 5, being the ſame with the firſt Number of each Column in *Table* 3.)

Example at 5 per Cent.

Table 3.	Table 5.		
.9523809	0.9523809	The Preſent Worth of 1*l.* Ann. for	1
.9070295	1.8594104		2
.8638376	2.7232480		3
.8227025	3.5459505		4 Years, &c.

Here the firſt Number in *Table* 5th, added to the 2d Number in *Table* 3d, the Sum is 1.8594104 the 2nd Number in *Table* 5, which 2nd Number added to the 3d Number in *Table* 3, the Sum is 2.7232480 the 3d Number in *Table* 5. And thus may the whole Table be conſtructed at each *Rate* of Intereſt.

Table 6, is conſtructed by dividing *Unity* by the Numbers in the 5th *Table*, the *Quotients* will be the Numbers in the *ſixth*; for as the Numbers in the 5th *Table* ſhew *what* muſt be given for 1*l.* *Annuity* for the Years againſt which they ſtand; it is therefore obvious that the Numbers in the 6th (which ſhew the *Annuity* that 1*l.* will purchaſe) may be found by this Proportion, namely, As any Number in the 5th *Table*, is to Unity; ſo is Unity, to the Number in the 6th, ſtanding againſt the ſame Years, and under the ſame *Rate*; and as Unity or 1, will always be the 2nd and 3d Terms in the Proportion, it follows, that the Numbers in the 6th *Table*, *are the Reſult of Unity divided by the Numbers in the* 5th.

Example at 5 per Cent.

Unity or 1 divided by	Table 5.	The Quot. is	Table 6.	The Ann. 1*l.* will purchaſe for	
	0.9523809		1.05		1
	1.8594104		.5378049		2
	2.7232480		.3672086		3
	3.5459505		.2820118		4 Years, &c.

The Uſe of the following Tables.

The *Uſe* of all theſe Tables, except in the 8th, 9th, and 10th Examples, depends on this one obvious and eaſy *General Rule.*

Multiply the Tabular Number which ſtands againſt the given Number of Days or Years, and under the given Rate of Intereſt, by the *given Sum*; and the Product will ſatisfy the Queſtion.

EXAMPLE I.

What will 358*l.* Amount to in 40 Days, at 5 *per Cent. per Annum*, *Compound Intereſt?*

In *Tab.* 1, againſt 40 Days, under 5 *per C.* ſtands,	1.0053611
Which multiplied by the *given* Sum ——	358
The Product is the *Amount* required, *viz.* *l.*	359.9192738

If the *Amount* of any *Principal* be ſought for a Number of Days which are not in the Table: Divide the given Number of Days into two ſuch Numbers as are in the Table, and multiply the Amounts anſwering thereto, into each other, and that Product by the Principal, which will give the *Amount* required.

EXAMPLE II.

What's the *Amount* of 523*l.* in 194 Days at 5 *per Cent*?

The two Parts of this Number in the Table are 190, and 4; and

$$\text{the Amount of } 1l. \text{ for } \left\{\begin{matrix}190\\4\end{matrix}\right\} \text{ Days at } 5\ per.\ C. \left\{\begin{matrix}1.0257228\\1.0005348\end{matrix}\right.$$

Then 1.0257228×1.0005348=1.0262714*l.* the *Amount* of 1*l.* for 194 Days, which multiplied by 523, the *Product* is 536.7399 &c.=536*l.* 14*s.* 9½*d.* the *Amount* required.

EXAMPLE III.

What will 425*l.* amount to in 21 Years at 4 *per Cent. per Annum.*

In *Table* 2. Againſt 21 Years & under 4 *per C.* is 2.2787681
Which multiplied by —— —— 425

The Product is the *Amount* required *l.* 968.4764 &c.

If the *Amount* be required for any Number of Years exceeding thoſe in the Table, and under 80, proceed with the Years as with the Days in the 2nd Example.

EXAMPLE IV.

What's the *Amount* of 100*l.* for 75 Years, at 4 *per Cent*?

$$\text{Firſt, the Amount of } 1l. \text{ for } \left\{\begin{matrix}40\\35\end{matrix}\right\} \text{ years at } 4\ per\ Cent. \text{ is } \left\{\begin{matrix}4.8010206\\3.9460889\end{matrix}\right.$$

Then

Then 4.8010206×3.9460889=18.945254*l.* the Amount of 1*l.* for 75 Years, which multiplied by 100, the Product is 1894.5254=1894*l.* 10*s.* 6*d.* the *Amount* required.

If the Amount be required for any Number of Years above 80; for Inſtance, Suppoſe the *Amount* of 1*l.* were required for 99 Years at 4 *per Cent*; firſt multiply the Amount of 1*l.* for 40 Years at the ſaid *Rate* by itſelf, and the Product will be the Amount of 1*l.* for 80 Years, which multiplied by the Amount of 1*l.* for 19 Years, the laſt Product will be found *l.* 48.5624 &c. the *Amount* required. Again, ſuppoſe the *Amount* of 1*l.* were required for 170 Years at the ſame *Rate:* multiply the Amount of 1*l.* for 80 Years (found as above directed) by itſelf, and the Product will be the Amount of 1*l.* for 160 Years, which multiplied by the Amount of 1*l.* for 10 Years, will give the *Amount* of 1*l.* for 170 Years=*l.*786.4437 &c. Whence it is eaſy to conceive that by means of the 2nd *Table*, the Amount of any Sum may be found for any Number of Years whatever. But it may be proper to obſerve that when the Years exceed the Table, a more eaſy way (to them who know their Uſe) is to work by *Logarithms.*

And here, as I have juſt mentioned an Inſtance wherein Logarithms are uſeful, it may not be unacceptable to thoſe of my Readers who are not acquainted with them, to be informed further of their Uſe: By the admirable Art of Logarithms then (which was at firſt invented by the Lord *Neiper*, Baron of *Merchiſton* in *Scotland*, and firſt publiſhed at *Edenburgh*, in the Year 1614) *Multiplication* and *Diviſion*, are performed by *Addition* and *Subtraction* only of two *Logarithmic* Numbers; and *Involution* (which is a continual Multiplication of a Number firſt multiplied into itſelf) by one Operation only in *Multiplication*; and *Evolution* or *Extraction of Roots*, by one Operation in *Diviſion*. Hence *they* are of great uſe in Extracting the *Square*, *Cube*, &c. *Roots*, and in ſolving Queſtions in *Compound Intereſt*, but more particularly in all *Trigonometrical* Calculations; but as they are not immediately neceſſary in Compound Intereſt (for I am ſhewing how the moſt uſeful Queſtions therein may eaſily be done without them) nor in any

Mercantile Computations, I have therefore not introduced them in this Treatiſe. But to proceed:

To find the *Amount* of a Sum for Years and Days, work as in the following Example.

EXAMPLE V.

What will 523*l.* amount to in 5 Years and 194 Days, at 5 *per Cent.*

Firſt. In *Table* 2, againſt 5 Years at 5 *per Cent.* is 1.2762816; and the Amount of 1*l.* for 194 Days, is 1.0262714 as *per* 2d *Example.*

Then, 1.2762816 × 1.0262714 = 1.3098113*l.* the Amount of 1*l.* for 5 Years and 194 Days, which multiplied by 523 the Principal, the Product is 685.0313 &c. =685*l.* 0*s.* 7½*d.* the *Amount* required.

EXAMPLE VI.

What's the *preſent Worth* of 968*l.* 9*s.* 6*d.*¼=968.476*l.* due 21 Years hence at 4 *per Cent per Annum?*

In *Table* 3, againſt 21 Years at 4 *per Cent.* is .4388336
Which multiplied by —— —— 968.476

The Product is the *preſent Worth* required *l.* 425.

Note, This is the *Reverſe* of *Example* 3.

In finding the preſent Worth of a Sum when the Years exceed the limits of the Table, proceed in a ſimilar manner to *Example* 4. The following is the *Reverſe* of it.

EXAMPLE VII.

What is the *preſent Worth* of 1894*l.* 10*s.* 6*d.*=1894.525*l.* due 75 Years hence, at 4 *per Cent.?*

Firſt, the preſent Worth of 1*l.* for $\left\{\begin{matrix}40\\35\end{matrix}\right\}$ Years at 4 *per Cent.* is $\left\{\begin{matrix}.2082890\\.2534155\end{matrix}\right.$

And, .208289×.2534155 = .0527837*l.* the preſent Worth of 1*l.* for 75 Years, which multiplied by 1894.525 the Product is 100*l.* the *preſent Worth* or *Principal* required.

It was ſhewn after *Example* 4. how the *Amount* of a Sum might be found for any Number of Years whatever, and after the like manner, by *Table* 3, the *preſent Worth* of a Sum for *any* Number of Years may alſo be found: But the other Tables relating to *Annuities* cannot be extended in this manner, nor do they but ſeldom require it.

If the *preſent Worth* of a Sum be required for Years and Days; firſt, find the Amount of 1*l.* at the *Rate* and *Time* given by *Tables* 1 and 2; by which divide the given Amount, and the Quotient will be the preſent Worth or Principal required, as in this Example.

EXAMPLE VIII.

What *Principal* being put to Intereſt, will raiſe a Stock of 685*l.* 0*s.* 7½*d.*=685.0313*l.* in 5 Years and 194 Days, at 5 *per Cent.?*

Firſt, the *Amount* of 1*l.* at the *Rate* and *Time* given is, 1.3098113*l.* *per Example* 5. (of which this is the *Converſe.*)

And 1.3098113)685.0313(=523*l.* the *Principal* required.

EXAMPLE IX.

In what *Time* will 425*l.* raiſe a *Stock* of (or amount to) 968*l.* 9*s.* 6¼*d.*=968.4764*l.* at 4 *per Cent. per Annum.*

Divide the propoſed Stock (viz. 968.4764) by the given Principal (viz. 425) and the Quotient will ſhew the Number in *Table* 2nd, under the given Rate that ſtands againſt the Time ſought. Thus 425)968.4664(2.2787681, and this Number being ſought in the ſaid Table under 4 *per Cent.* will be found to ſtand againſt 21 *Years*, which is the *Time* required.

But if the Quotient cannot be truly found in the 2nd *Table*, as above, then take out the next leſs Number, and make it a Diviſor, by which divide the firſt Quotient, and then ſeek the ſecond Quotient in *Table* 1, but if it cannot be truly found, in the 1ſt *Table*, take out the next leſs Number *there* likewiſe, and divide the ſecond Quotient by it, and then ſeek again for the third Quotient, and the the Numbers thus found in the 1ſt *Table*, will aſſign the Number of Days as in this Example.

EXAMPLE X.

In what *Time* will 523*l.* raiſe a *Stock* of 685*l.* 0*s.* 7½*d.*= 685.0313*l.* at 5 *per Cent.*

Firſt, 523)685.0313(1.3098113, and the Number next leſs to it in *Table* 2, under 5 *per Cent* is 1.2762816 which ſtands againſt 5 *Years*.

Next, 1.2762 &c.)1.3098 &c.(=1.0262714, and the Number next leſs to it in *Table* 1, under the ſame *Rate*, is 1.0257228 ſtanding againſt 190 *Days*.

Laſtly, 1.0257 &c.)1.0262 &c.(=1.0005348 which ſtands againſt 4 *Days*. Hence the Anſwer is 5 *Years* and 194 *Days*.

Note, the 5 firſt of theſe Examples ſhew the *Uſe* of the *Tables* in *Caſe* 1ſt of *Compound Intereſt*, the 6th, 7th, and 8th in *Caſe* 2nd, and the two laſt in *Caſe* 3d. The three following Examples are relating to *Annuities*.

EXAMPLE XI.

If 50*l.* yearly Rent or Annuity be forborn or unpaid 14 Years, What will it amount to at 4 *per Cent. per Annum.* *Compound Intereſt?*

In *Table* 4, for the *Time* and *Rate*, is —	18.2919112
Which multiplied by ———	50
The Product is the *Amount* required	*l.* 914.5955600

EXAMPLE

EXAMPLE XII.

What is 50*l.* Yearly Rent to continue 14 Years, worth in ready Money, allowing 4 *per Cent. Compound Intereſt*, to the Purchaſer?

In *Table* 5, for the *Time* and *Rate* is —— 10.5631223
Which multiplied by —— — 50

The Product is the *preſent Worth* required, *l.* 528.1561150

EXAMPLE XIII.

What Annuity to continue 14 Years, will 528*l.* 3*s.* 1½*d.* =528.1561*l.* purchaſe, allowing 4 *per Cent. Compound Intereſt* to the Purchaſer?

In *Table* 6, for the *Time* and *Rate* is —— .094669
Which multiplied by ——— 528.1561

The Product is the *Annuity*, — — *l.* 50.

To the foregoing Examples I ſhall next add a few Queſtions of a more Complex Nature, and which frequently happen, in order to ſhew the more extenſive uſe of the Tables.

QUESTION I.

What is the *Value* of the *Reverſion* of a *Freehold Eſtate*, of 50*l.* yearly Income, to commence 7 Years hence, allowing the Purchaſer 4 *per Cent. Compound Intereſt* for his ready Payment?

Agreeable to the 2nd *Caſe* of purchaſing Freehold Eſtates (Page 126) the *full Value* of the ſaid Eſtate, at 4 *per Cent.* is *l.* 1250.

By *Table* 5, the *preſent Worth* of 50*l* *per Annum* for 7 Years at the ſaid *Rate* may be found to be } 300.102735

The *Difference* is the *Value of the Reverſion* *l.* 949.897265

QUES-

QUESTION II.

Suppoſe the *Reverſion* of a *Freehold Eſtate* to commence 7 Years hence, is ſold for 949*l.* 17*s.* 11¼*d.*=949.897 *l.* what muſt be the yearly Income for the Purchaſer to get 4 *per Cent.* for his Money ?

By *Tab.* 2, the *Amount* of 949.897*l.* for 7 Years at 4 *per Cent.* may be found to be 1250*l.* which is the full Value of the Eſtate.

And the *Income* of an Eſtate worth 1250*l.* allowing Intereſt at 4 *per Cent*, is 50*l.* *per Annum*, agreeable to *Caſe* 1 of purchaſing Freehold Eſtates.

QUESTION III.

Which is moſt advantagious, a *Term* of 19 Years in an Eſtate of 100*l.* *per Annum*, or the *Reverſion* of ſuch an Eſtate for ever after the *Expiration* of the ſaid 19 Years; computing at the *Rate* of 4 *per Cent. Compound Intereſt ?*

This Queſtion is done in the ſame manner as the 1ſt.

Firſt then, a Freehold Eſtate of 100*l.* *per Annum* at 4 *per Cent.* is Worth — *l.* 2500.

And (by *Table* 5.) the preſent Worth of 100*l.* Annuity for 19 Years at the ſaid *Rate* will be found — — } 1313.39385

The Difference is the Value of the *Reverſion* *l.* 1186.60615

Hence it appears that the *firſt Term* of 19 Years is better than the *Reverſion* for ever afterwards by 126.7877*l.* = 126*l.* 15*s.* 9*d.*

Note, The three foregoing Queſtions are thoſe alluded to, Page 125.

QUESTION IV.

Suppoſe I have 790*l.* to be paid me within 7 Years, in this manner; at the end of the firſt Year 90*l.* of two Years,

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100*l.* of four Years, 200*l.* and of ſeven Years, 400*l.* *Query*, what the *preſent Worth* of thoſe ſeveral Payments is in *ready Money*, and alſo what is the *equated Time* ſuppoſing the 790*l.* to be paid at one Payment, allowing 4½ *per Cent. Compound Intereſt.*

In *Table* 3, the *preſent Worth* of 1*l.* at 4½ *per Cent.* due at the end of 1 Year is — 0.9569378
Which multiply by — 90

The Product is the *preſent Worth* of 90*l.* = 86.124402
Thus the preſent Worth of 100*l.* due at the End of 2 *Years* is found } = 91.57299
Alſo, of 200*l.* at the End of 4 *Years* = 167.71226
And of 400*l.* at the End of 7 *Years* = 293.9314

The Sum of all theſe is — *l.* 639.341052

Which is the *preſent Worth* required, from which and the given *Amount* 790*l.* the *equated Time*, by working as in the 10th *Example*, (Page 215) will be found 4 *Years* and 294 *Days*.

And in like manner may any Queſtion be anſwered in *Equation of Payments* at *Compound Intereſt*, when the *Payments* are due at the Expiration of *any Number of Years*; but if due at the end of ſo many *Years* and *Days*, the *preſent Worth* of each Payment muſt be found as in *Example* 8.

QUESTION V.

A owes B 420*l.* to be paid in 14 Years, *viz.* at the end of every 2 Years 60*l.* but he would agree to pay him in 7 *Years* by equal *Payments* each Year, which B agrees to, and at the Rate of 4 *per Cent. per Annum*, *Compound Intereſt.* *Query*, what the *Annual Payments* muſt be?

1. Find the *preſent Worth* (by *Table* 3) of the 7 Payments which were at firſt to be made, as *per Queſtion* 4, which you will find to be 310.68 *l.*

2. Then

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2. Then find (by *Table* 6) what *Annuity*, to continue 7 Years at the given *Rate*, 310.68*l.* will purchaſe; which you will find to be *l.* 51.7623=51*l.* 15*s.* 3*d.* the Anſwer

QUESTION VI.

A has a Term of 7 Years in an *Eſtate* of 40*l.* *per Ann*: B has a Term of 14 Years in the ſame Eſtate in *Reverſion* after the 7 Years; and C has a further Term of 14 Years in *Reverſion* after the 21 Years. *Query* the *preſent Values* of the *ſeveral Terms* at the *Rate* of 5 *per Cent.*?

By *Table* 5. the *preſent Value* of 40*l.* *per Annum* may be found

	l.	*s.*	*d.*
for 35 Years, to be ——	654 :	19 :	4
for 21 Years, to be ——	512 :	16 :	11
for 7 Years, to be ——	231 :	9 :	1
Which Subtract from each other it will appear			
That the *preſent Value* of A's Term is	231 :	9 :	1
of B's Term	281 :	7 :	10
of C's Term	142 :	2 :	5
For theſe *Values* Anſwer the Queſtion	*l.* 654 :	19 :	4

QUESTION VII.

A Perſon having 12 Years to come, in a *Leaſe* of an Eſtate of 60*l.* *per Annum* for 40 Years, would know what *preſent Money* he muſt pay in order to *renew* or *compleat* the *Leaſe* by adding 28 Years thereto, computing at 5 *per Cent.* *Compound Intereſt*?

By *Table* 5. the *preſent Value* of 1*l.* *per Annum* at 5 *per Cent.* for 40 Years, is	*l.* 17.1590862
By the ſame Table, the *Value* of 1*l* *per Annum* at that *Rate* for 12 Years to come, is	*l.* 8.8632516
The difference is —	8.2958346
Which multiplied by —	60
The Product is the Anſwer, *viz.*	*l.* 497.750 &c.

QUESTION VIII.

What *Annuity* to continue 14 Years, may be purchaſed with 1000*l.* to be paid 5 Years after the *Commencement* of the *Annuity* at 5 *per Cent?*

By *Table* 5, the *preſent Worth* of 1000*l.* due 5 Years hence at 5 *per Cent.* may be found 783.5262 *l.* And

By *Table* 6, it may be found, that the *Annuity* which 783.5262*l.* will purchaſe for 14 Years at the *Rate* of 5 *per Cent.* is 79.1549=79 *l.* 3 *s.* 1 *d. per Annum.* the Anſwer.

QUESTION IX.

For a *Leaſe* of certain *Profits* for 7 Years, A. offers to pay 150*l.* as a *Fine*, and 300*l. per Annum*; B offers 400*l.* *Fine*, and 250*l. per Annum*; C bids 650*l.* *Fine*, and 200*l.* *per Annum*; and D bids 1800*l.* *Fine* without any Rent: *Query* which is the beſt *Offer*, and what the *Difference*, computing at 4 *per Cent?*

1. By *Table* 5, the *preſent Worth* of 300*l.* *per Annum* for 7 Years at the ſaid *Rate*, is found to be	*l.* 1800.6164
To which add — —	150.
The *Sum* is the *preſent Worth* of A's Offer	*l.* 1950.6164

2. By *Table* 5, the *preſent Worth* of 250*l.* *per Annum* for 7 Years at the ſaid *Rate*, is	*l.* 1500.5136
To which add — — —	400.
The Sum is the *preſent Worth* of B's Offer	*l.* 1900.5136

3. By *Table* 5, the *preſent Worth* of 200*l.* *per Annum* for the given *Time* and *Rate*, is	*l.* 1200.4109
To which add — — —	650.
The Sum, the *preſent Worth* of C's Offer	*l.* 1850.4109

Hence it appears that A's is the *beſt* offer, and that (rejecting the Decimals) A bids 50*l.* more than B, 100*l.* more than C, and 150*l.* more than D, which fully Anſwers the Queſtion.

QUESTION X.

What *Annuity* is ſufficient to pay off a *Debt* of 90 *Millions* in 40 Years at 3 *per Cent. Compound Intereſt?*

In *Tab.* 6, againſt 40 Years &under 3 *per Cent.* is .0432624
Which multiply by the Debt ——→ 90000000

The Product is the *Annuity* ſought, *viz.* *l.* 3893616

So that ſuppoſing the *National Debt* to be 90 *Millions*, and the Intereſt paid to be 2700000*l. per Annum*, or 3 *per Cent.* then would a *Sinking Fund* of 1193616*l. per Annum*, clear the whole *Debt* in 40 Years.

Note, In the foregoing Queſtions relating to *Annuities*, they are ſuppoſed to be payable at *yearly* Payments, other Tables being requiſite for anſwering Queſtions when the Payments are made *half-yearly* or *quarterly*, but what has been ſaid of the *Conſtruction* aud *Uſe* of *theſe*, may ſuffice to ſhew the Nature and Manner of uſing *thoſe* calculated for *half-yearly* or *quarterly* Payments.

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DECIMAL TABLES of COMPOUND INTEREST

At the Rates of 3; 3½; 4; 4½; and 5 per Cent. per Annum.

TABLE I. The Amount of one Pound for Days.

Days.	3 per Cent.	3½ per Cent.	4 per Cent.	4½ per Cent.	5 per Cent.
1	1.0000809	1.0000942	1.0001074	1.0001206	1.0001336
2	1.0001619	1.0001885	1.0002149	1.0002412	1.0002673
3	1.0002429	1.0002827	1.0003224	1.0003618	1.0004011
4	1.0003240	1.0003770	1.0004299	1.0004824	1.0005348
5	1.0004050	1.0004713	1.0005374	1.0006031	1.0006685
6	1.0004860	1.0005656	1.0006449	1.0007238	1.0008023
7	1.0005670	1.0006600	1.0007524	1.0008445	1.0009361
8	1.0006480	1.0007542	1.0008600	1.0009652	1.0010699
9	1.0007291	1.0008486	1.0009675	1.0010859	1.0012037
10	1.0008101	1.0009429	1.0010751	1.0012066	1.0013376
20	1.0016209	1.0018867	1.0021513	1.0024148	1.0026770
30	1.0024324	1.0028315	1.0032288	1.0036243	1.0040182
40	1.0032445	1.0037771	1.0043074	1.0048354	1.0053611
50	1.0040573	1.0047236	1.0053871	1.0060479	1.0067059
60	1.0048708	1.0056710	1.0064680	1.0072618	1.0080525
70	1.0056849	1.0066193	1.0075501	1.0084773	1.0094009
80	1.0064996	1.0075685	1.0086333	1.0096942	1.0107511
90	1.0073151	1.0085186	1.0097177	1.0109125	1.0121031
100	1.0081311	1.0094696	1.0108033	1.0121324	1.0134569
110	1.0089479	1.0104214	1.0118900	1.0133537	1.0148125
120	1.0097653	1.0113742	1.0129779	1.0145765	1.0161699
130	1.0105834	1.0123279	1.0140670	1.0158007	1.0175291
140	1.0114021	1.0132825	1.0151572	1.0170265	1.0188902
150	1.0122215	1.0142379	1.0162487	1.0182537	1.0202531
160	1.0130415	1.0151943	1.0173412	1.0194824	1.0216178
170	1.0138629	1.0161516	1.0184350	1.0207126	1.0229843
180	1.0146837	1.0171098	1.0195299	1.0219442	1.0243527
190	1.0155057	1.0180689	1.0206261	1.0231774	1.0257228
200	1.0163284	1.0190288	1.0217233	1.0244120	1.0270949
210	1.0171518	1.0199897	1 0228218	1.0256481	1.0284687
220	1.0179759	1.0209515	1.0239215	1.0268858	1.0298444
230	1.0188006	1.0219142	1 0250223	1.0281249	1.0312219
240	1.0196260	1.0228778	1 0261243	1.0293655	1.0326013
250	1.0204520	1.0238424	1.0272275	1.0306076	1.0339825
260	1.0212788	1.0248078	1.0283319	1.0318512	1.0353656
270	1.0221062	1.0257741	1.0294375	1.0330963	1.0367505
280	1 0229342	1.0267414	1.0305443	1.0343429	1.0381373
290	1.0237630	1.0277096	1.0316522	1.0355910	1.0395259
300	1.0245924	1.0286786	1.0327614	1.0368406	1.0409164
310	1.0254225	1.0296486	1 0338717	1.0380917	1.0423087
320	1.0262532	1.0306195	1.0349832	1.0393444	1.0437029
330	1.0270847	1.0315914	1.0360960	1.0405985	1.0450990
340	1.0279168	1.0325641	1.0372099	1.0418542	1.0464969
350	1.0287495	1.0335378	1.0383250	1.0431114	1.0478967
360	1.0295830	1.0345123	1.0394413	1.0443700	1.0492984

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TABLE II. *The* Amount *of one Pound for* Years.

Years	3 *per Cent.*	3½ *per Cent.*	4 *per Cent.*	4½ *per Cent.*	5 *per Cent.*
1	1.0300000	1.0350000	1.0400000	1.0450000	1.0500000
2	1.0609000	1.0712250	1.0816000	1.0920250	1.1025000
3	1.0927270	1.1087178	1.1248640	1.1411661	1.1576250
4	1.1255088	1.1475230	1.1698586	1.1925186	1,2155063
5	1.1592740	1.1876863	1.2166529	1.2461819	1.2762816
6	1.1940523	1.2292553	1.2653190	1.3022601	1.3400956
7	1.2298738	1.2722792	1.3159318	1.3608618	1.4071004
8	1.2667700	1.3168090	1.3685691	1.4221006	1.4774554
9	1.3047731	1.3628973	1.4233118	1.4860951	1.5513282
10	1.3439163	1.4105987	1.4802443	1.5529694	1.6288946
11	1.3842338	1.4599697	1.5394541	1.6228530	1.7103393
12	1.4257608	1.5110686	1.6010322	1.6958814	1.7958563
13	1.4685337	1.5639560	1.6650735	1.7721961	1.8856491
14	1.5125897	1.6186945	1.7316764	1.8519449	1.9799316
15	1.5579674	1.6753488	1.8009435	1.9352824	2.0789282
16	1.6047064	1.7339860	1.8729812	2.0223701	2.1828746
17	1.6528476	1.7946755	1.9479005	2,1133768	2.2920183
18	1.7024330	1.8574892	2.0258165	2.2084787	2.4066192
19	1.7535060	1.9225013	2.1068492	2.3078603	2.5269502
20	1.8061112	1.9897588	2.1911231	2.4117140	2.6532977
21	1.8602945	2.0594314	2.2787681	2.5202411	2.7859626
22	1.9161034	2.1315115	2.3699188	2.6336520	2.9252607
23	1.9735865	2.2061144	2.4647155	2.7521663	3.0715238
24	2.0327941	2.2833284	2.5633042	2.8760138	3.2251000
25	2.0937779	2.3632449	2.6658363	3,0054344	3.3863549
26	2.1565912	2.4459585	2.7724697	3.1406790	3.5556727
27	2.2212890	2.5315671	2,8833685	3.2820095	3.7334563
28	2.2879276	2.6201719	2.9987033	3.4296999	3.9201291
29	2.3565655	2.7118779	3.1186514	3.5840364	4.1161356
30	2.4272624	2.8067937	3.2433975	3.7453181	4.3219424
31	2.5000803	2.9050314	3.3731334	3.9138574	4.5380395
32	2.5750827	3.0067075	3,5080587	4.0899810	4.7649415
33	2.6523352	3.1119423	3.6483811	4.2740301	5.0031885
34	2.7319053	3.2208603	3.7943163	4 4663615	5.2533480
35	2.8138624	3.3335904	3.9460889	4.6673478	5.5160154
36	2.8982783	3.4502661	4.1039325	4.8773784	5.7918161
37	2.9852266	3.5710254	4.2680898	5.0968604	6.0814069
38	3.0747834	3.6960113	4.4388134	5.3262192	6.3854773
39	3.1670269	3.8253717	4.6163659	5 5658990	6.7047511
40	3.2620377	3.9592597	4.8010206	5.8163645	7.0399887

TABLE III. *The* preſent Worth *of* 1 *l.* *for* Years.

Years	3 *per Cent.*	3½ *per Ct.*	4 *per Cent.*	4½ *per Ct.*	5 *per Cent.*
1	.9708738	.9661836	.9615385	9569378	.9523809
2	.9425959	.9335107	.9245562	.9157299	.9070295
3	.9151417	.9019427	.8889964	.8762966	.8638376
4	.8884870	.8714422	.8548042	.8385613	.8227025
5	.8626088	.8419732	.8219271	8024511	.7835262
6	.8374843	.8135006	.7903145	.7678957	.7462154
7	.8130915	.7859910	.7599178	.7348285	.7106813
8	.7894092	.7594116	.7306902	.7031851	.6768394
9	.7664167	.7337310	.7025867	.6729044	.6446089
10	.7440939	.7089188	.6755642	.6439277	.6139133
11	.7224213	.6849457	.6495809	.6161987	.5846793
12	.7013799	.6617833	.6245971	.5896639	.5568374
13	.6809513	.6394041	.6005741	.5642716	5303214
14	6611178	.6177818	.5774751	.5399729	.5050679
15	.6418619	.5968906	.5552645	.5167204	.4810171
16	.6231669	.5767059	.5339082	.4944693	.4581115
17	.6050164	.5572038	.5133733	.4731764	.4362967
18	.5873946	.5383611	.4936281	.4528004	4155207
19	.5702860	.5201557	.4746424	.4333018	.3957340
20	.5536758	.5025659	.4563870	.4146429	.3768895
21	.5375493	.4855709	.4388336	.3967874	.3589424
22	.5218925	.4691506	.4219554	.3797009	.3418499
23	.5066917	.4532856	.4057263	3633501	.3255713
24	.4919337	.4379571	.3901215	.3477035	.3100679
25	.4776056	.4231470	3751168	.3327306	.2953028
26	.4636947	4088378	.3606892	.3184025	2812407
27	.4501891	.3950123	.3468166	.3046914	.2678483
28	.4370768	.3816543	.3334775	.2915707	.2550936
29	.4243464	.3687482	.3206514	.2790150	.2429463
30	.4119868	.3562784	.3083187	.2670000	.2313775
31	.3999871	.3442304	.2964603	.2555024	.2203595
32	.3883370	.3325897	.2850579	.2444999	.2098662
33	.3770263	.3213427	.2740942	2339712	.1998726
34	.3660449	.3104761	.2635521	.2238959	.1903548
35	.3553834	.2999769	.2534155	.2142544	.1812903
36	.3450324	.2898327	.2436687	.2050282	.1726574
37	.3349829	.2800316	.2342969	.1961992	.1644356
38	.3252262	.2705619	.2252854	.1877504	.1566054
39	.3157536	.2614125	.2166206	.1796655	.1491479
40	.3065568	2525725	.2082890	1719287	.1420457

TABLE IV. *The* Amount *of* 1*l.* per Annum, *or* Annuity *for* Years.

Years	3 *per Cent.*	3½ *per Cent.*	4 *per Cent.*	4½ *per Cent.*	5 *per Cent.*
1	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000
2	2.0300000	2.0350000	2.0400000	2.0450000	2.0500000
3	3.0909000	3.1062250	3.1216000	3.1370250	3.1525000
4	4.1836270	4.2149429	4.2464640	4.2781911	4.3101250
5	5.3091358	5.3624659	5.4163226	5.4707097	5.5256312
6	6.4684099	6.5501522	6.6329755	6.7168917	6.8019128
7	7.6624622	7.7794075	7.8982945	8.0191518	8.1420084
8	8.8923360	9.0516866	9.2142263	9.3800136	9 5491089
9	10.1591061	10.3684958	10.5827953	10.8021142	11.0265643
10	11.4638793	11.7313931	12.0061071	12.2882094	12.5778925
11	12.8077957	13.1419919	13.4863514	13.8411788	14.2067871
12	14.1920296	14.6019616	15.0258055	15.4640318	15.9171265
13	15 6177904	16.1130303	16.6268377	17.1599133	17.7129828
14	17.0863242	17.6769864	18.2919112	18.9321094	19.5986320
15	18,5989139	19.2956809	20.0235876	20.7840543	21.5785636
16	20.1568813	20.9710297	21.8245311	22.7193367	23.6574918
17	21.7615877	22.7050158	23.6975124	24.7417069	25.8403664
18	23.4144354	24.4996913	25.6454129	26.8550837	28.1323847
19	25.1168684	26,3571805	27.6712294	29.0635625	30.5390039
20	26.8703745	28.2796818	29.7780786	31.3714228	33.0659541
21	28.6764857	30.2694707	31.9692017	33.7831368	35.7192518
22	30 5367803	32.3289022	34.2479698	36.3033779	38.5052144
23	32.4528837	34.4604137	36.6178886	38,9370299	41.4304751
24	34.4264702	36.6665282	39.0826041	41.6891963	44.5019989
25	36.4592643	38.9498567	41.6459083	44.5652101	47.7270988
26	38.5530422	41.3131017	44.3117446	47.5706446	51.1134538
27	40.7096335	43.7590602	47.0842144	50.7113236	54.6691265
28	42.9309225	46.2906273	49.9675830	53.9933332	58.4025828
29	45.2188502	48.9107993	52.9662863	57.4230332	62.3227119
30	47.5754157	51.6226772	56.0849377	61.0070697	66.4388475
31	50.0026782	54.4294710	59.3283352	64.7523878	70.7607899
32	52.5027585	57.3345025	62.7014687	68.6662452	75.2988294
33	55.0778413	60.3412101	66.2095274	72.7562263	80.0637708
34	57.7301765	63.4531524	69.8579085	77.0302565	85.0669594
35	60.4620818	66.6740127	73.6522248	81.4966180	90.3203073
36	63.2759443	70.0076032	77.5983138	86.1639658	95.8363227
37	66.1742226	73.4578693	81.7022464	91.0413443	101.6281388
38	69.1594493	77.0288947	85.9703362	96.1382048	107.7095458
39	72.2342327	80.7249060	90.4091497	101.4644240	114.0950231
40	75.4012597	84.5502778	95.0255157	107.0303231	120.7997742

TABLE V. *The* preſent Worth *of* 1*l.* per An. *or* Annuity *for* Years.

Years	3 *per Cent.*	3½ *per Cent.*	4 *per Cent.*	4½ *per Cent.*	5 *per Cent.*
1	0.9708738	0.9661836	0.9615385	0.9569378	0.9523809
2	1 9134697	1.8996943	1.8860947	1.8726678	1.8594104
3	2.8286114	2.8016370	2.7750910	2.7489644	2.7232480
4	3.7170984	3.6730792	3.6298952	3.5875257	3.5459505
5	4.5797072	4.5150524	4.4518223	4.3899767	4.3294767
6	5.4171914	5.3285530	5.2421369	5,1578725	5.0756921
7	6.2302829	6.1145439	6.0020547	5.8927009	5.7863734
8	7.0196922	6.8739555	6.7327448	6.5958861	6.4632128
9	7.7861089	7.6076865	7.4353314	7.2687905	7.1078217
10	8.5302028	8.3166053	8.1108955	7.9127182	7.7217349
11	9.2526241	9.0015510	8.7604763	8.5289169	8.3064142
12	9.9540040	9.6633343	9.3850733	9.1185808	8.8632516
13	10.6349553	10.3027385	9.9856473	9.6828524	9.3935730
14	11.2960731	10.9205203	10.5631223	10.2228253	9.8986409
15	11.9379351	11.5174109	11.1183868	10.7395457	10.3796580
16	12.5611020	12.0941168	11.6522949	11.2340151	10.8377695
17	13.1661185	12.6513206	12.1656680	11.7071914	11.2740662
18	13.7535131	13.1896817	12.6592961	12.1599918	11.6895869
19	14.3237991	13.7098374	13.1339385	12.5932936	12.0853208
20	14.8774748	14.2124033	13.5903253	13 0079365	12.4622103
21	15.4150241	14.6979742	14.0291589	13.4047239	12.8211527
22	15.9369166	15.1671248	14.4511142	13.7844248	13.1630026
23	16.4436084	15.6204105	14.8568405	14.1477749	13,4885739
24	16.9355421	16.0583676	15.2469619	14.4954784	13.7986418
25	17 4131477	16.4815146	15.6220787	14.8282089	14.0939445
26	17.8768424	16.8903523	15.9827678	15.1466115	14.3751853
27	18.3270315	17.2853645	16.3295844	15.4513028	14.6430336
28	18.7641082	17.6670188	16.6630618	15.7428735	14.8981272
29	19.1884546	18.0357670	16.9837132	16.0218885	15.1410735
30	19.6004413	18.3920454	17.2920318	16.2888885	15.3724510
31	20.0004285	18.7362758	17.5884921	16.5443909	15.5928104
32	20.3887655	19.0688656	17.8735500	16 7888909	15.8026766
33	20 7657918	19.3902082	18.1476441	17.0228621	16.0025491
34	21.1318367	19.7006842	18.4111962	17.2467580	16.1929039
35	21.4872200	20.0006612	18.6646116	17.4610124	16.3741942
36	21.8322525	20.2904938	18.9082803	17.6660406	16.5468516
37	22.1672354	20.5705254	19.1425771	17.8622398	16.7112872
38	22.4924616	20.8410874	19.3678625	18.0499902	16.8678926
39	22.8082151	21.1024999	19.5844831	18.2296557	17.0170406
40	23.1147719	21.3550723	19.7927721	18.4015844	17.1590862

TABLE VI. *The* Annuity *which* 1 *l.* *will purchaſe for any Number of* Years.

Years	3 *per Cent*	3½ *per Cent.*	4 *per Cent.*	4½ *per Cent.*	5 *per Cent.*
1	1.0300000	1.0350000	1.0400000	1,0450000	1.0500000
2	.5226108	.5264005	.530196	.5339976	.5378049
3	.3535304	.3569342	.3603485	.3637734	.3672086
4	.2690271	.2722511	.2754901	.2787437	.2820118
5	.2183546	.2214814	.2246271	.2277916	.2309748
6	.1845975	.1876682	.1907619	.1938784	.1970175
7	.1605064	.1635445	.1666096	.1697015	.1728198
8	.1424564	.1454767	.1485279	.1516097	.1547218
9	.1284339	.1314460	.1344930	.1375745	.1406901
10	.1172305	.1202414	.1232909	.1263788	.1295046
11	.1080775	.1110920	.1141490	.1172482	.1203889
12	.1004621	.1034840	.1065522	.1096662	.1128254
13	.0940295	.0970616	.1001437	.1032754	.1064558
14	.0885263	.0915707	.0946690	.0978203	.1010240
15	.0837666	.0868251	.0899411	.0931138	.0963423
16	.0796109	.0826848	.0858200	.0890154	.0922699
17	.0759525	.0790431	.0821985	.0854176	.0886991
18	.0727087	.0758168	.0789933	.0822369	.0855462
19	.0698139	.0729403	.0761386	.0794073	.0827450
20	.0672157	.0703611	.0735818	.0768761	.0802426
21	.0648718	.0680366	.0712801	.0746006	.0779961
22	.0627474	.0659321	.0691988	.0725457	.0759705
23	.0608139	.0640188	.0673091	.0706825	.0741368
24	.0590474	.0622728	.0655868	.0689870	.0724709
25	.0574279	.0606740	.0640120	.0674390	.0709525
26	.0559383	.0592054	.0625674	.0660214	.0695643
27	0545642	.0578524	.0612385	.0647195	.0682919
28	.0532932	.0566027	.0600130	.0635208	.0671225
29	.0521147	.0554454	.0588799	.0624146	.0660455
30	.0510193	.0543713	.0578301	.0613915	.0650514
31	.0499989	.0533724	.0568554	.0604435	.0641321
32	.0490466	.0524415	.0559486	.0595632	.0632804
33	.0481561	.0515724	.0551036	.0587445	.0624900
34	.0473220	.0507597	.0543148	.0579819	.0617554
35	.0465393	.0499984	.0535773	.0572705	.0610717
36	.0458038	.0492842	.0528869	.0566058	.0604345
37	.0451116	.0486133	.0522396	.0559840	.0598398
38	.0444593	.0479821	.0516319	.0554017	.0592842
39	.0438439	.0473878	.0510608	.0548557	.0587646
40	.0432624	.0468273	.0505235	0543431	0582782

SECT. III. *Of* Annuities *upon* Lives.

I ſhall here give the following Tables, taken from Mr. *Hodgſon's Annuities upon Lives*, the Computation of which he deduces from the *London* Bills of Mortality for 10 ſucceſſive Years from the Year 1728.

The Value of Annuities upon Lives at the Rate *of* 3 per Cent. per Annum.

Ages.	Years Value.	Ages.	Years Value.	Ages.	Years Value.	Ages.	Years Value.
1	15.3092	24	15.5185	47	11.4286	70	6.9102
2	17.6004	25	15.2797	48	11.2391	71	6.6986
3	19.0145	26	15.0755	49	11.0526	72	6.5092
4	19.6644	27	14.8688	50	10.8713	73	6.3508
5	19.8524	28	14.6580	51	10.6884	74	6.2355
6	19.9220	29	14.4409	52	10.5125	75	6.0168
7	19.9062	30	14.2624	53	10.3443	76	5.8251
8	19.8460	31	14.0708	54	10.1853	77	5.4898
9	19.7372	32	13.8883	55	9.9642	78	5.1596
10	19.5761	33	13.7040	56	9.9743	79	4.8283
11	19.3183	34	13.5190	57	9.5379	80	4.5023
12	19.0618	35	13.3320	58	9.3317	81	4.1861
13	18.7800	36	13.1432	59	9.1338	82	3.8867
14	18.4877	37	12.9547	60	8.9473	83	3.6168
15	18.1708	38	12.7645	61	8.7721	84	3.3980
16	17.8023	39	12.5734	62	8.5251	85	3.2666
17	17.4262	40	12.4328	63	8.2829	86	2.9354
18	17.0818	41	12.2888	64	8.0458	87	2.6393
19	16.7682	42	12.1719	65	7.8154	88	2.3994
20	16.4856	43	12.0637	66	7.5963	89	2.1378
21	16.2359	44	11.9113	67	7.3907	90	1.8772
22	15.9775	45	11.7651	68	7.2031		
23	15.7532	46	11.6468	69	7.0395		

The Value of Annuities upon Lives at the Rate of 4 per Cent. per Annum.

Ages.	*Years Value.*	*Ages.*	*Years Value*	*Ages.*	*Years Value.*	*Ages.*	*Years Value.*
1	13.9428	24	14.1129	47	10.6777	70	6.6315
2	15.7678	25	13.9187	48	10.5133	71	6.4356
3	16.8523	26	13.7520	49	10.3504	72	6.2603
4	17.3394	27	13.5831	50	10.1920	73	6.1136
5	17.4788	28	13.4094	51	10.0323	74	6.0069
6	17.5303	29	13.2305	52	9.8776	75	5.8025
7	17.5187	30	13.0828	53	9.7293	76	5.6233
8	17.4741	31	12.9233	54	9.5891	77	5.3100
9	17.3934	32	12.7715	55	9.3941	78	4.9990
10	17.2738	33	12.6177	56	9.2028	79	4.6864
11	17.0809	34	12.4622	57	9.0146	80	4.3781
12	16.8880	35	12.3051	58	8.8310	81	4.0768
13	16.6751	36	12.1463	59	8.6537	82	3.7915
14	16.4522	37	11.9836	60	8.4860	83	3.5335
15	16.2093	38	11.8250	61	8.3285	84	3.3229
16	15.9249	39	11.6628	62	8.1063	85	3.1965
17	15.6323	40	11.5424	63	7.8864	86	2.8778
18	15.3619	41	11.4191	64	7.6711	87	2.5912
19	15.1143	42	11.3189	65	7.4620	88	2.3582
20	14.8901	43	11.2262	66	7.2614	89	2.1041
21	14.6908	44	11.0954	67	7.0729	90	1.8506
22	14.4836	45	10.9689	68	6.9009		
23	14.3026	46	10.8665	69	6.7510		

The Uſe of the preceding Tables.

Let it be required to find the *Value* of an *Annuity* of 50 *l.* upon the *Life* of a Perſon 14 Years of Age, Money being valued at 3 *per Cent.*

In the *Table* at 3 *per Cent.* againſt the Age of 14 is 18.4877 Years Value or Purchaſe, which multiplied by 50 the *Annuity*, the Product is 924.385=924 *l.* 7 *s.* 8¼ *d.* the *Value* of the *Annuity* ſought. And thus the Value of the ſaid Annuity on the ſame Age at 4 *per Cent.* may be found by the 4 *per Cent. Table* to be 822.61=822 *l.* 12 *s.* 2½ *d.*

2$\frac{1}{2}$ *d.* So that the *higher* the *Rate* of Intereſt is, the *leſs* is the Value of *Annuities.*

By comparing *theſe Tables* of *Annuities on Lives* with the 5th *Table* of *Compound Intereſt*, the *certain* Annuity may be found equal in Value to an Annuity on any *Life.* For Inſtance, Suppoſe it were required to find the certain *Annuity* equal in Value to an Annuity on a *Life* of 14 Years of Age, which is worth 18.4877 Years purchaſe at 3 *per Cent.* as appears by the 3 *per Cent. Table of Annuities on Lives.*

By entering the 5th *Table* in the Column under the ſame Rate, namely, 3 *per Cent.* with the ſaid 18.4877 Years Purchaſe, you will find that it is greater than the Value of an Annuity certain for the Term of 27 Years (that being 18.327 Years Purchaſe) and leſs than the Value of an Annuity certain for the Term of 28 Years, (which is 18.7641 Years Purchaſe) and by making a proportionable Allowance for the Exceſs of 18.4877 the given Annuity, above 18.327 the Value of an Annuity certain for 27 Years, you will find that the Value of an Annuity on a Life of 14 Years of Age, is equal to the Value of an Annuity certain for the Term of 27.3676 Years. Which certain Annuity is equal in Value to the ſaid Life, ſuppoſing Money to be valued at any other Rate of Intereſt; for by applying to the 5th *Table*, in the Column under 4 *per Cent.* with 16.4522 Years Purchaſe, the Value of the aforeſaid Life at that *Rate* of Intereſt, and making a proportionable Allowance for the Exceſs of 16.4522 above 16.3296, the Value of an Annuity certain for 27 Years at 4 *per Cent.* you will find the Annuity for Life equal in Value to an Annuity certain for the ſame Term as before, namely, 27.3676 Years.

In like Manner, the Value of an Annuity on a Life of 1 Year will be found equal to an Annuity certain for the Term of 20.8031 Years: And the Value of a Life of 2 Years of Age, equal in Value to an Annuity certain for the Term of 25.4039 Years: And ſo on, as in the following Table, which ſhews the *certain Annuities* equal in Value to *Annuities on Lives* from the Age of 1 Year to 90.

The Value of Lives upon Annuities certain.

Age.	*Years certain.*	Ages.	*Years certain.*	Ages.	*Years certain.*	Ages.	*Years certain.*
1	20.8031	24	21.1984	47	14.2064	70	7.8613
2	25.4039	25	20.7482	48	13.9138	71	7.5932
3	28.5901	26	20.3684	49	13.6317	72	7.3533
4	30.1599	27	19.9842	50	13.3574	73	7.1516
5	30.6300	28	19.6063	51	13.0808	74	7.0066
6	30.8037	29	19.2116	52	12.8201	75	6.7374
7	30.7646	30	18.8923	53	12.5732	76	6.5016
8	30.6142	31	18.5563	54	12.3397	77	6.0893
9	30.3420	32	18.2364	55	12.0150	78	5.6924
10	29.9409	33	17.9157	56	11.7081	79	5.2968
11	29.3152	34	17.6007	57	11.4068	80	4.9103
12	28.7015	35	17.2824	58	11.1128	81	4.5437
13	28.0374	36	16.9622	59	10.8356	82	4.1966
14	27.3676	37	16.6505	60	10.5774	83	3.8372
15	26.6531	38	16.3363	61	10.3349	84	3.6408
16	25.8395	39	16.0204	62	9.9932	85	3.4929
17	25.0283	40	15.7941	63	9.6677	86	3.1201
18	24.3063	41	15.5632	64	9.3490	87	2.7931
19	23.6599	42	15.3755	65	9.0395	88	2.5310
20	23.0853	43	15.2019	66	8.7524	89	2.2452
21	22.5901	44	14.9586	67	8.4841	90	1.9616
22	22.0801	45	14.7308	68	8.2393		
23	21.6480	46	14.5464	69	8.0258		

By Help of *this Table* and the 5th *Table* of *Compound Intereſt*, the Value of any ſingle Life from 1 to 90 Years of Age at any of the Rates of Intereſt in the ſaid 5th *Table* may be readily found. For Inſtance, Suppoſe it were required to find the Value of a Life of 50 Years of Age, Intereſt at 3½ *per Cent.*

Firſt, by the above Table, a Life of 50 Years of Age is found equal to an Annuity certain for the Term of 13.3574 Years; then entering the 5th *Table*, in the Column under 3½ *per Cent.* I find, that an Annuity certain for a Term of 13 Years is worth 10.3027 Years Purchaſe, and that an Annuity certain for a Term of 14 Years is worth 10.9205 Years Purchaſe, and by making a proportionable Allowance for the Decimal .3574, we ſhall have .2208, which added to 10.3027, the Value of an Annuity certain for 13 Years, the Sum is 10.5235, which ſhews that a Life of 50 Years is worth 10.5235 Years Purchaſe, at the *Rate* of 3½ *per Cent.* And after the ſame Manner may the Value of any other Life be found at any Rate of Intereſt in the ſaid 5th *Table.*

The laſt Table is alſo uſeful in finding the Value of a *Reverſion* for ſo many Years, to commence at the Death of a Perſon.

EXAMPLE.

What's the preſent Worth of an Eſtate for 10 Years after the Death of a Perſon of 64 Years of Age, at 4½ *per Cent.*?

By the foregoing Table, a Life of 64 Years is equal in Value to an Annuity for 9.349 Years certain, but rejecting the Decimals, It will be near enough for our preſent Purpoſe to reckon the Life equal in Value to an Annuity for 9 Years certain.

Then $9+10=19$ Years.
And by *Table* 5th, under 4½ *per Cent.*
an Ann. for 19 *Years* is worth — 12.5933
And an Annuity for 9 *Years*,
is worth — 7.2688 } Years Purchaſe
Which ſubtract, the Rem. is, 5.3245

Which is the *Worth* of the Reverſion for 10 Years.

Mr. *Hodgſon* makes it appear from the afore-mentioned Bills of Mortality, that out of every thouſand Perſons ſuppoſed to be born at the ſame Time, no more than 710 lived to the Age of one Year, 614 to the Age of two Years, *&c.* as in the following *Table*, where the 1ſt, 3d, *&c.* Columns ſhew the Ages, the 2d, 4th, *&c.* the Number of Perſons that lived to that Age. From which Table he deduces the Computations whereby the Tables, *Page* 228 and 229, are conſtructed, and alſo ſhews by it how the Value of an Annuity on any *Number* of Lives of *equal* Ages may be eaſily found.

Ages.	Living.	Ages.	Living.	Ages.	Living.	Ages.	Living.	Ages.	Living.	Ages.	Living.
Born	1000	16	473	32	367	48	220	64	105	80	29
1	710	17	471	33	358	49	212	65	99	81	26
2	614	18	468	34	349	50	204	66	93	82	23
3	564	19	464	35	340	51	196	67	87	83	20
4	539	20	459	36	331	52	188	68	81	84	17
5	526	21	453	37	322	53	180	69	75	85	14
6	516	22	447	38	313	54	172	70	69	86	12
7	508	23	440	39	304	55	165	71	64	87	10
8	501	24	433	40	294	56	158	72	59	88	8
9	495	25	426	41	284	57	151	73	54	89	6
10	490	26	418	42	274	58	144	74	49	90	5
11	486	27	410	43	264	59	137	75	45	91	4
12	482	28	402	44	255	60	130	76	41	92	3
13	479	29	394	45	246	61	123	77	38	93	2
14	477	30	385	46	237	62	117	78	35	94	1
15	475	31	376	47	228	63	111	79	32	95	0

To ſhew the Uſe of the foregoing Table, in regard to Annuities on any Number of Lives of equal Ages, Let the Value of an Annuity be required on the *joint Lives* of 2 Perſons 10 Years of Age, to continue during the Life of the Survivor.

You will find by the Table, that out of 1000 Perſons ſuppoſed to be born at the ſame Time, no more than 490 are living at the Age of 10 Years, which Number being divided by 2, (the Number of Perſons on whoſe Lives the Value of the Annuity is required) the Quotient is 245, and the neareſt Number in the Table to 245 is 246, the Number of Perſons living at 45 Years of Age; ſo that of the 490 Perſons living at 10 Years of Age, one out of two lives to the Age of 45, which being 35 more than 10; Hence the *Value* of an Annuity on the *Lives* of 2 *Perſons* of 10 Years of Age, is equal to an *Annuity certain* for the Term of 35 Years.

Again, Let the Value of an Annuity be required on the *joint Lives* of 3 Perſons of 21 Years of Age. It appears by the Table, that the Number of the Perſons living at 21 Years of Age is 453, which divided by 3, the Quotient is 151, which appears to be the Number of Perſons living at 57 Years of Age; ſo that of the 453 Perſons living at 21 Years of Age, one out of three Lives to the Age of 57 Years, from which ſubtract 21, the Age of the Perſons on whoſe Lives the Value of an Annuity is required, the Remainder is 36; hence an *Annuity* on the *ſaid Lives* is of equal Value with an *Annuity certain* for the Term of 36 Years. And thus may the Value of an Annuity be found on any Number of Lives of any equal Age.

CHAP.

CHAP. X.

Of Circulating *or* Repeating Decimals, *their* Uſe, *&c.*

1. WHEN the *Denominator* of a Vulgar Fraction is an aliquot Part of the *Numerator* increaſed by affixing Cyphers thereto, the Decimal equivalent to ſuch a Fraction, will be compleat and terminate, as $\frac{1}{2}=.5$; $\frac{1}{4}=.25$; $\frac{6}{240}=.025$; $\frac{11}{80}=.1375$; $\frac{3}{960}=.003125$.

2. But if the *Denominator* be no aliquot Part of the *Numerator* thus increaſed, the Decimal equivalent to ſuch a Fraction will be interminate or endleſs; that is, it will conſtantly repeat one Digit only; as $\frac{1}{3}=.3333$, *&c. ad infinitum*; or $\frac{2}{3}=.6666$, *&c.* or $\frac{7}{12}=.583333$, *&c.* or $\frac{5}{36}$ $=.138888$, *&c. ſine fine.*

3. Or elſe a certain Number of Figures perpetually circulate, or repeat in the Quotient. Thus, $\frac{2}{11}=.18\ 18\ 18$, *&c. ad infinitum*; alſo, $\frac{5}{27}=.185\ 185\ 185$, *&c.* and $\frac{20}{21}$ $=.952380\ 952380$, *&c.* and $\frac{3}{220}=.01\ 36\ 36\ 36$, *&c.* without End.

4. And thoſe Numbers which thus infinitely circulate or repeat are termed *Repetends.* Thoſe which circulate a Digit only, are called a *Single Repetend*; and thoſe in which ſeveral Figures circulate, are called a *Compound Repetend.* And it is uſual to daſh the firſt and laſt of the repeating Figures, thereby making one Place of the *Repetend* ſufficient. Thus the Examples above are thus wrote or expreſſed; $.\cancel{3}$; $.\cancel{6}$; $.58\cancel{3}$; $.13\cancel{8}$. And the *Compound Repetends* thus; $.\cancel{1}\cancel{8}$; $.\cancel{1}8\cancel{5}$; $.\cancel{9}5238\cancel{0}$; and $.01\cancel{3}\cancel{6}$.

5. In a *Compound Repetend*, any one of the circulating Figures may be made the firſt of the Repetend; for inſtance, in the *Repetend*, $8.6\cancel{3}2\cancel{5}\ 325\ 325$, *&c.* it may be made, $8.63\cancel{2}5\cancel{3}$; or $8.632\cancel{5}3\cancel{2}$. And by this Means any two or more *Repetends* may be made to begin and end in the ſame Place; and then they are ſaid to be *conterminous.*

SECT. I. ADDITION *of* Repeating Decimals.

CASE I.

If they are *Single Repetends*, make them all *conterminous*, then add as uſual, only to the laſt, or Right-hand Place of Decimals, add as many *Units* as there are *Nines* in it, and that *laſt Digit* will be a *Repetend*.

EXAMPLES.

	$124.2\cancel{3}3$		$5.91\cancel{6}66$	$4.72708\cancel{3}$
	$64.51\cancel{6}$		$0.0208\cancel{3}$	$2.58\cancel{3}333$
	$0.\cancel{3}33$		$2.5626\cancel{0}$	$0.00208\cancel{3}$
	$59.8\cancel{0}0$		$4.8\cancel{3}333$	$9.0291\cancel{6}6$
	$3.8\cancel{3}3$		$9.041\cancel{6}6$	$4.03125\cancel{0}$
	$45.02\cancel{6}$		$2.\cancel{0}6666$	$17.03575\cancel{6}$
Sum	$297.74\cancel{3}$	Sum	$12.0417\cancel{6}$	Sum $37.40867\cancel{3}$

CASE II.

If the Decimals are *Compound Repetends*, (tho' the foregoing Chapters ſhew that 5 or 6 Places of Decimals are generally ſufficient, yet) to have the Sum compleat, this Rule muſt be obſerved.

From the Place where all the Repetends *begin together*, continue each Decimal to a Number of Places equal to the leaſt *common Multiple* of thoſe ſeveral Numbers which repreſent the Places of Figures in the ſaid Repetends; then add, and to the laſt Place add as many Units as there are 10's in the Place where the Repetends all begin together, and the Figures in thoſe two Places, are the *firſt* and the *laſt* of the *Repetend*.

Note, One Number is ſaid to be the *Multiple* of another, when it contains a certain Number of Times without any Remainder.

To find the leaſt *common Multiple* of any two Numbers, obſerve theſe Directions.

1. If a Number *cannot* be found that is an aliquot Part of both the given Numbers, the *Product* of the ſaid Numbers multiplied together, will be the leaſt *common Multiple* required; thus the leaſt *common Multiple* of the Number 3, and 7 is 21, equal to 7×3.

2. If a Number *can* be found that is an aliquot Part of both the given Numbers, *divide* either of the given Numbers by *it*, and the *Quotient multiplied* by the other given Number, will be the leaſt *common Multiple* of the ſaid Numbers; for Inſtance, what is the leaſt common Multiple of the Numbers 6 and 8? here 2 is an aliquot Part of both Numbers, and $6 \div 2 = 3$, and $3 \times 8 = 24$, the leaſt *common Multiple* required.

If the leaſt *common Multiple* of more than two Numbers be required, firſt find the leaſt common Multiple of any two of the Numbers; for Inſtance, what is the leaſt *common Mnltiple* of the Numbers 2, 3, and 4? Firſt, the leaſt common *Multiple* of 2 and 3, is 6, (*per Direction* 1.) And the leaſt *common Multiple* of the Number laſt found, namely, 6, and the other given Number 4, is 12 (*per* Direction 2d.) So that 12 is the leaſt *common Multiple* of the Number, 2, 3, and 4. In like Manner you may proceed to find the leaſt *common Multiple* of 4, 5, or more different Numbers.

Examples in Addition of Compound Repetends.

	$13.\cancel{0}46\cancel{7}$	$14.\cancel{4}7295\cancel{6}$	$121.4\cancel{7}2\cancel{3}7$
	$2.\cancel{6}04\cancel{3}$	$12.\cancel{3}0724\cancel{3}$	$80.27\cancel{8}55$
	$5.\cancel{7}23\cancel{4}$	$9.\cancel{0}2076\cancel{3}$	$64.90\cancel{6}3\cancel{4}$
	$6.\cancel{8}37\cancel{7}$	$11.\cancel{0}1237\cancel{3}$	$80.07\cancel{4}44$
Sum	$28.\cancel{7}11\cancel{3}$	$47.\cancel{7}1333\cancel{8}$	$346.72\cancel{8}7\cancel{7}$

	175.3724	4.713213	2.94395439543
	84.5634	2.824750	1.041041041041
	176.4826	0.036036	3.737373737373
	79.3279	8.415415	4.065820065826
	105.7105	7.070707	4.731473147314
Sum	571.4270	25.760128	16.830109431099

Note, If a *compleat* or *terminate* Decimal be to be added with the *Repetends*, you muſt affix Cyphers thereto, to eſteem and deal with them as *Repetends*.

SECT. II.

SUBTRACTION *of* Repeating Decimals.

CASE I.

If the Decimals *repeat Single Figures*, proceed to place them as in the 1ſt *Caſe* of *Addition*, and ſubtract as uſual; except that when the Subtrahend is the greater Number, you muſt increaſe the upper Figure by 9 only, and in every ſuch Caſe carry one to the next Place.

EXAMPLES.

From	54.78333	57.5280	1672.4510	47.957200
Subtract	17.95410	49.5833	879.3000	.008310
Remains	36.77910	7.9453	793.1510	47.948883

CASE II.

If the Decimals be *Compound Repetends*, order them as directed in the 2nd *Caſe* of *Addition*; and look if you muſt borrow one in the Place where *both Repetends* begin together; if ſo, you muſt add one to the right hand Place of the *Subtrahend*; and that Figure in the Remainder under the Place where both Repetends begins together will be the *firſt*, and the right hand Figure the *laſt* of the *Repetend*.

EXAMPLES.

From	47.4178178	153.92749	75.5333
Subtract	15.5656565	142.85353	42.7597
Remains	31.8521612	11.07395	32.7735

From	47.8840260	75.2758000	49.5285285
Subtract	40.9259259	47.3563563	38.4736000
Remains	6.9581001	27.9194436	11.0549285

SECT. III.

MULTIPLICATION *of* repeating Decimals.

CASE I.

If the *Multiplicand* be a *Repetend only*, and the *Multiplier a Single Digit*, multipiy as uſual; only obſerve to *add* in the *laſt Place* of the Product as *many Units* as it contains *Nines*, and that Place is a *Repetend*.

EXAMPLES.

Multiply	10.7016	9.305	476.05
by	5	7	.08
Product	53.5083	65.138	38.0844

But if the *Multiplier* conſiſts of *ſeveral* Digits or Figures, then make each particular Product *conterminous*, by continuing the *ſingle* Repetend of each toward the right hand.

EXAMPLE.

Multiply $748.6\cancel{4}$
by $.634$

$29945\cancel{7}$
$22459\cancel{3}3$
$44918\cancel{6}66$

Product $474.6405\cancel{7}$

If the *Multiplier* be a *Repetend*, multiply as uſual; but in the Product, cut off *one Place leſs* for Decimals than uſual (which is all one as *multiplying by Ten*) and divide by Nine; continue the Quotient till it becomes a *Single* or *Compound Repetend*; and this ſhall be the *true Reſult* or Anſwer.

EXAMPLES.

Multiply 724.35
by $.0\cancel{4}$

$9)289.74\dot{0}$

Product $32{:}19\cancel{3}$

Multiply $26.5\cancel{4}$
by $.0\cancel{3}$

$9)7.96\cancel{3}$

Product $.88\cancel{4}8\cancel{1}$

Multiply 251.43
by $8.7\cancel{4}$

$9)100.572$

$11.174\cancel{6}$
176001
201144

Product $2198.615\cancel{6}$

Multiply $48.75\cancel{4}$
by $2.1\cancel{3}$

$9)14.626\cancel{3}$

$1.625\cancel{1}4\cancel{8}$
$4875\cancel{4}44$
$9750\cancel{8}888$

Product $104.009\cancel{4}8\cancel{1}$

CASE

CASE II.

If the *Multiplicand* be a *Compound Repetend*, and the *Multiplier* but a *ſingle Digit*, multiply as in *common* Decimals; but obſerve to add to the right hand Place of the Product ſo *many Units* as there are *Tens* in the Product of the left hand Place of the *Repetend*. And the *Product* ſhall contain a *Repetend* whoſe Places are *equal* to thoſe in the *Multiplicand*.

EXAMPLES.

Multiply	$582.\cancel{3}4\cancel{7}$	$592\cancel{4}.37\cancel{8}$	$34\cancel{4}9.2\cancel{3}$
by	8	$.03$	$.007$
Product	$4658.\cancel{7}7\cancel{8}$	$177.7\cancel{3}13\cancel{5}$	$26.2\cancel{4}46\cancel{4}$

If the *Multiplier* conſiſts of Places *more than one*, make all the ſeveral Products *conterminous* towards the right hand, as taught in the *laſt Caſe*.

EXAMPLES.

Multiply	$73.2\cancel{5}8\cancel{6}$	Multiply	$402\cancel{7}.301\cancel{7}$
by	43.7	by	4370.2
	$5128\cancel{1}0\cancel{6}$		$805\cancel{4}602\cancel{8}$
	$2197\cancel{7}5\cancel{9}7$		$2819\cancel{1}108\cancel{9}11$
	$2930\cancel{3}4\cancel{6}34$		$1208\cancel{1}903\cancel{8}190$
			$1610\cancel{9}205\cancel{0}9205$
Product	$3201.40\cancel{3}3\cancel{8}$	Product	$17600112.\cancel{0}233\cancel{7}$

If there are no *Repetends* in the *Multiplicand*, and the *Mnltiplier* be a *Compound Repetend*, firſt Multiply as in common Decimals; then add the Reſult to itſelf in this manner, ſet the firſt left hand Figure ſo many Places forward as *exceeds* the Number of Places in the Repetend by one; and the reſt of the Figures in order after it; and thus proceed till the Reſult *laſt added* be carried *beyond the firſt*; Laſtly, add theſe ſeveral Reſults together, beginning under the right hand Place of the firſt, and from thence *daſh as many* Figures for a *Repetend*, *as the Repetend* of the *Multiplier* does *conſiſt of.*

EXAMPLES.

Multiply 235.01
by 3.26

141006
47002
70503

Firſt Product 766.1326
7661326
7661326

True Product 766.8994

Multiply 432067
by .07436

2592402
1296201
1728268
864134

Firſt Prod. 10525.15212
1.052515 &c.
105 &c.

True Prod. 10526.20474

Multiply 42710.36
by .20403

12813108
17084144
8542072

Firſt Prod. 8714.1947508
87141947 &c.
871 &c.

True Pro. 8714.2818936

If the *Multiplier* has any *terminate* Places joined with the *Repetend*, and if the Repetend *be ſmall* and theſe *many*, the beſt way will be to multiply by the Repetend firſt;

and then multiply by the *terminate Figures*, and add their Products to the Product of the *Repetend*; and to this *laſt Reſult* add the ſaid *Repetend Product*, as in the laſt Examples.

EXAMPLE

Multiply 432.43
by 23.414

172972
43243

The Product 6.05402 of the Repetend.
172972
129729
86486

10124.91602
605402
6054 &c.
60 &c.

True Product 10124.97717

But if the *terminate Figures* are *few*, and the Places of the Repetend are *many*; the ſhorteſt way will be to ſubtract the *terminate Figures* from thoſe of the *Repetend*, and multiply by the *Remainder* as a *Repetend*.

EXAMPLE.

Multiply 1243.2701
by $42\acute{3}.43\acute{0}$
From which Subtract 42 the terminate Figures.

Remains a *new* Multiplier 423.394

49730804
111894309
37298103
37298103
24865402
49730804

Firſt Product 526393.1007194
52.63931007 &c.
526393 &c.
52 &c.

True Product $526445.745\acute{7}93\acute{0}$

Note, The five laſt Sums may alſo be done by changing the *Factors*, that is, by making a Multiplicand of the Multiplier, and a Multiplier of the Multiplicand, and then proceed as directed Page 241.

If *both Factors* are *interminate*, or have *compound Repetends*, the Places of the Repetend in the Product will be *uncertain* as to their *Number*, and can only be determined (in any manner fit for Practice) by *continuing* and *repeating* the *firſt Product*, which will contain *a certain Repetend*, being equal in Places to that of the Multiplicand.

EXAMPLE

Multiply	$3.1\dot{4}\dot{5}$	
by	$4.\dot{2}9\dot{7}$	
Subtract	4	the *terminate* Part.
Remains	4.293	a *new* Multiplier.
	$943\dot{6}\dot{3}$	
	$2830\dot{9}\dot{0}$	
	$62\dot{9}\dot{0}90$	
	$125\dot{8}\dot{1}818$	
First Product	$13.5034\dot{3}\dot{6}3636$ &c.	
	135034363 &c.	
	135034 &c.	
	135 &c.	
True Product	$13.5\dot{1}6953\dot{3}$	

Note, If the *true* Product runs *far* 'ere it begins to repeat it may be found to any Number of Places, by continuing the *first* Product and adding it as above. But here it may be obſerved, that tho' by the Methods taught in this Caſe the reſpective Products are found to the greateſt accuracy; yet Sums having a *Compound Repetend* in either of the Factors may generally be done eaſier, and ſufficiently exact for Buſineſs by the *contracted way* of Multiplying taught at the Beginning.

SECT. IV.

DIVISION *of* repeating Decimals.

CASE I.

If the *Dividend* contains a *Single Repetend*, and the Diviſor be either a *Single terminate Digit*, or any *Number* of *terminate Digits*, divide as uſual, and the Quotient will *repeat*

repeat either a *Single Digit* or a *Compound Repetend*, and *frequently begin* when the Repetend is *first taken down*, but *not always*.

EXAMPLES.

$$
\begin{array}{l}
4)195.0\dot{2}(48.7\dot{5} \\
\underline{\;16\;\;} \\
\;\;35 \\
\;\;\underline{33\;} \\
\;\;\;30 \\
\;\;\;\underline{28\;} \\
\;\;\;\;\left.\begin{array}{l}22\\20\end{array}\right\}\textit{ad infinitum.} \\
\;\;\;\;\underline{\;\;\;} \\
\;\;\;\;\;2
\end{array}
$$

$$
\begin{array}{l}
8)79.2\dot{6}(9.908\dot{3} \\
\underline{\;72\;\;} \\
\;\;72 \\
\;\;\underline{72\;} \\
\;\;\;.66 \\
\;\;\;\;\underline{64\;} \\
\;\;\;\;\left.\begin{array}{l}26\\24\end{array}\right\}\textit{ad infinitum.} \\
\;\;\;\;\underline{\;\;\;} \\
\;\;\;\;\;.2
\end{array}
$$

$$
\begin{array}{l}
6)3076.\dot{1}(512.6\dot{8}5\dot{1} \\
\underline{\;30\;\;} \\
\;\;.7 \\
\;\;\underline{\;6\;} \\
\;\;16 \\
\;\;\underline{12\;} \\
\;\;\;41 \\
\;\;\;\underline{36\;} \\
\;\;\;\;\left.\begin{array}{l}51\\\underline{48}\\31\\\underline{30}\\11\\\;\;6\end{array}\right\}\textit{ad infinitum.} \\
\;\;\;\;\;\underline{\;\;\;} \\
\;\;\;\;\;\;5
\end{array}
$$

$$
\begin{array}{l}
7)51.\dot{2}(7.\dot{3}17460\dot{0} \\
\underline{\;49\;\;} \\
\;\;\left.\begin{array}{l}22\\\underline{21}\\\;12\\\;\;\underline{7}\\\;\;52\\\;\;\underline{49}\\\;\;\;32\\\;\;\;\underline{28}\\\;\;\;\;42\\\;\;\;\;42\end{array}\right\}\textit{ad infinitum.} \\
\;\;\;\;\;\underline{\;\;\;} \\
\;\;\;\;\;\;.2
\end{array}
$$

$$\begin{array}{l}
487.65)106036.78\dot{3}(217.\dot{4}\\
\quad\quad\quad 97530\\ \hline
\quad\quad\quad 85067\\
\quad\quad\quad 48765\\ \hline
\quad\quad\quad 363028\\
\quad\quad\quad 341355\\ \hline
\quad\quad\quad\quad 216733 \\
\quad\quad\quad\quad 195060 \\ \hline
\quad\quad\quad\quad 21673
\end{array}$$

} *ad infinitum.*

$$\begin{array}{l}
6.72)68904.\dot{8}(10253.7\dot{0}\\
\quad\quad 672\\ \hline
\quad\quad 1704\\
\quad\quad 1344\\ \hline
\quad\quad\ 3608\\
\quad\quad\ 3360\\ \hline
\quad\quad\ \ 2488\\
\quad\quad\ \ 2016\\ \hline
\quad\quad\quad 4728\\
\quad\quad\quad 4704\\ \hline
\quad\quad\quad\ \ 248
\end{array}$$

} *ad infinitum.*

If the Diviſor be only a *Single Repetend*, and the Dividend be either a *terminate Number* or contains a *Repetend*, place the Dividend under itſelf, but *one place forward* to the right hand, and then Subtract, the Remainder will be *a new* Dividend, then divide as uſual, and the Quotient will be either *terminate*, *repeat* a *Single Digit*, or elſe a *Compound Repetend*.

EXAMPLE

EXAMPLE.

Divide 572.4 by .8
57.24
.8)515.16(= the new Dividend
48 643.95 the true Quotient.

35
32

31
24

76
72

40
40

Otherwiſe thus, multiply the Dividend by 9, cutting off one more right hand Figure in the Product, which will be a new Dividend the ſame as before.

The Dividend 572.4 as before
multiply by 9

The Product 515.16 a new Dividend as before.

'Tis plain that both theſe Ways will give the ſame Quotient, and that the Quotient this way produced is the *only true one*, will appear from the Work of the laſt Example at large.

$$\begin{array}{r|l}
.\cancel{8})572.4 & \cancel{0}000\ \&c.(643.95
\end{array}$$

$$\left.\begin{array}{r|l}
5\cancel{3}33 & 3333\ \&c. \\ \hline
390 & \cancel{0}666\ \&c. \\
3\cancel{5}5 & 5555\ \&c. \\ \hline
35 & \cancel{1}111\ \&c. \\
2\cancel{6} & 6666\ \&c. \\ \hline
8 & \cancel{4}444\ \&c. \\
8 & \cancel{0}000\ \&c. \\ \hline
 & \cancel{4}444\ \&c. \\
 & \cancel{4}444\ \&c. \\ \hline
\end{array}\right\}\ \textit{ad infinitum.}$$

$$\cdot\ \cdot\ \cdot\ \cdot$$

In this Operation, 'tis manifeſt though the *Repetends* in every particular Step would proceed to *Infinity*, yet in the laſt Place you ſee there is an *infinite Product* equal to an *infinite Remainder* ; and conſequently the Work muſt there ceaſe, and the Quotient nevertheleſs be *true*.

More EXAMPLES.

Divide $450.9\cancel{8}$ by $.0\cancel{6}$

$$\begin{array}{r}
45.09\cancel{8} \\ \hline
.06)405.86\cancel{0}(6764.\cancel{3} \\
36\phantom{.86\cancel{0}(6764.\cancel{3}} \\ \hline
45\phantom{.6\cancel{0}(6764.\cancel{3}} \\
42\phantom{.6\cancel{0}(6764.\cancel{3}} \\ \hline
38\phantom{\cancel{0}(6764.\cancel{3}} \\
36\phantom{\cancel{0}(6764.\cancel{3}} \\ \hline
26\phantom{(6764.\cancel{3}} \\
24\phantom{(6764.\cancel{3}} \\ \hline
\left.\begin{array}{r} 20 \\ 18 \end{array}\right\}\ \textit{ad infinitum.} \\ \hline
\end{array}$$

Divide $23.4\acute{6}$ by $\acute{7}$

$$\begin{array}{r}
2.34\acute{6}\\ \hline
\end{array}$$

$$\begin{array}{l}
7)21.12\acute{0}(3.01\acute{7}1428\acute{5}\\
\quad 21\\ \hline
\quad .12\\
\quad\ \ 7\\ \hline
\left.\begin{array}{r}50\\49\\ \hline 10\\7\\ \hline 30\\28\\ \hline 20\\14\\ \hline 60\\56\\ \hline 40\\35\end{array}\right\}\textit{ad infinitum.}\\ \hline
\qquad\quad 5
\end{array}$$

If the Diviſor conſiſts of *terminate Numbers* joined to the *Repetend*; ſubtract the *terminate* Numbers of the Diviſor from the Diviſor itſelf, and the *Remainder* ſhall be *a new* Diviſor, and proceed with the Dividend as in the two laſt Examples.

EXAMPLE.

Divide 8567.28 by $4.8\dot{6}$

```
             4.86̇      8567.28
               48       856.728
             ----      --------
New Diviſor  4.38)     7710.552(1760.4
                       438
                       ----
                        3330
                        3066
                        ----
                         2645
                         2628
                         ----
                          1752
                          1752
                          ----
                          ....
```

CASE II.

If *Compound Repetends* are found in the Diviſor and Dividend, or in the Diviſor only, obſerve to ſet the Diviſor and Dividend under themſelves ſo many Places *forwards* to the Right-hand, as there are Places in the *Repetend* of the Diviſor; next ſubtract them, and the Remainder will be reſpectively a *new* Diviſor and Dividend.

EXAMPLES.

Divide $243.\cancel{3}0\cancel{6}$ by $11\cancel{1}.9\cancel{8}$

$$\begin{array}{r} 11\cancel{1}.9\cancel{8} \\ 11 \\ \hline 111.87 \end{array}$$

$$\begin{array}{r} 243.\cancel{3}0\cancel{6} \\ .243 \\ \hline)243.063(2.1\cancel{7}\cancel{2} \\ 22374 \\ \hline 19323 \\ 11187 \\ \hline \left.\begin{array}{r} 81360 \\ 78309 \\ \hline 30510 \\ 22374 \end{array}\right\} \textit{ad infinitum.} \\ \hline 8136 \end{array}$$

For the Truth of this Quotient, ſee the following Work.

$$\begin{array}{r} 11\cancel{1}.9\cancel{8})243.\cancel{3}0\cancel{6}(2.1\cancel{7}\cancel{2} \text{ as} \\ 22\cancel{3}9\cancel{6}3 \text{ before.} \\ \hline 19\cancel{3}4\cancel{2} \\ 11\cancel{1}9\cancel{8} \\ \hline \left.\begin{array}{r} 8\cancel{1}4\cancel{4}1 \\ 78\cancel{3}8\cancel{7} \\ \hline 3\cancel{0}5\cancel{4}0 \\ 22\cancel{3}9\cancel{6} \end{array}\right\} \textit{ad infinitum.} \\ \hline 8\cancel{1}4\cancel{4}1 \end{array}$$

Divide $350\cancel{3}7.7\cancel{6}$ by $24\cancel{8}.\cancel{6}$

$$\begin{array}{r} 24\cancel{8}.\cancel{6} \\ 2.4 \\ \hline 246.2 \end{array}$$

$$\begin{array}{r} 350\cancel{3}7.7\cancel{6}37 \\ 350.\cancel{3}77\cancel{6} \\ \hline)34687.\cancel{3}86\cancel{1}(14\cancel{0}.89\cancel{1} \\ 2462 \\ \hline 10067 \\ 9848 \\ \hline \left.\begin{array}{r} 21938 \\ 19696 \\ \hline 22426 \\ 22158 \\ \hline 2681 \\ 2462 \end{array}\right\} \textit{ad infinitum.} \\ \hline 219 \end{array}$$

If there be no *terminate* Part of the Diviſor, you ſubtract nothing from it.

Divide 70005 by $\dot{1}.4\dot{8}$

70005
70.005

1.48)69934.995(47253.375
592

1073
1036

374
296

789
740

499
444

555
444

1110
1036

740
740

...

Divide $2\dot{7}3.121\dot{4}$ by $\dot{5}1\dot{3}$

$2\dot{7}3.121\dot{4}731$
$2\dot{7}3121\dot{4}$

$.513)272.8\dot{4}83510\!\!\!/(5\dot{3}1.868\dot{1}$
2565

1634
1539

958
513

4453
4104

3495
3078

4171
4104

676
513

163

ad infinitum.

If there be no *Repetend* in the *Diviſor*, whatever the Dividend may be, there is *no Subtraction* to be made of either Diviſor or Dividend.

Divide $5377.0\acute{6}1\acute{7}$ by 70.52

```
70.52)5377.0612(76.2487
       49364
       -----
        44066
        42312
        -----
         17541
         14104
         -----
          34377  ⎤
          28208  ⎥
          -----  ⎥
           61696 ⎥
           56416 ⎬ ad infinitum.
           ----- ⎥
            62801⎥
            49364⎥
            -----⎦
             3437
```

In Diviſion it may often happen that the Quotient may *not repeat* ſo ſoon as is deſired; in ſuch Caſe it may be continued to any Number of Places at Pleaſure.

The *Reaſon* of the different Methods and peculiar Proceſſes uſed in the *Arithmetic* of *Circulating Numbers*, called *Repetends*, will appear from the following *Lemmas* and *Corollaries.*

LEMMA. I.

A *Series* of *Nines infinitely* continued, is equal to *Unity*, or One, in the next Left-hand Place; thus, 0.999 &c. is equal to 1; and .0999 &c.=.1; and .00999 &c.= .01; and 54.999 &c.=55.

Demonſtration. 'Tis evident that .9=$\frac{9}{10}$ wants only $\frac{1}{10}$ of Unity; and .99 wants $\frac{1}{100}$; .999 wants $\frac{1}{1000}$; ſo that if the Series were continued to *Infinity*, the Difference *between* that *Series* of *Nines* and an *Unit*, would be equal to *Unity divided by Infinity*, that is, *Nothing* at all. *Q. E. D.*

LEMMA II.

Any *Single Repetend divided* by 10, and the *Quotient* ſubtracted from the ſaid Repetend, the *Remainder* will be the *ſame Number compleat or terminate.*

Demonſtration. Let the given Repetend be 6.666 *&c.* this divided by 10, the Quotient is .666 *&c.* which Quotient ſubtracted from 6.666 *&c.* the Remainder is 6.

Thus 477.77 *&c.* will become 430 and .3333 *&c.* will be .3. *Q. E. D.*

COROLLARY I.

Hence it follows, that if any *Compound Repetend* be divided by an Unit with ſo many Cyphers annexed as are equal to the Places of the Repetend, and the *Quotient* ſubtracted from the ſaid *Repetend*, the *Remainder* will be the *ſame Number compleat or terminate*, that conſtituted the *Repetend*; thus, $\cancel{3}2\cancel{5}.325$ divided by 1000 is $.\cancel{3}2\cancel{5}$, which ſubtracted from $\cancel{3}2\cancel{5}.325$, the Remainder is 325: Thus $.0\cancel{7}4\cancel{3}$ will be .0743; and $12.\cancel{7}4\cancel{3}$ will be 12.731; and $52\cancel{7}5.\cancel{3}$ will become 5270.1.

COROLLARY II.

Hence alſo, if any *Repetend* be divided by an *Unit* with as many Cyphers as it contains Places, and the *Quotient* multiplied by as many *Nines* as the Repetend contains Places, the Reſult wlil be the ſame as before; that is, the *ſame Number terminate or compleat*, for any Number divided by 10, and the Quotient ſubtracted, the Remainder is the ſame as the Quotient multiplied by Nine.

Thus 6.666 *&c.*÷10=.6666 *&c.*

And .6666 *&c.*×9=5.999 *&c.*=6 (by *Lemma* 1.) and 6 is equal to 6.666 *&c.*—.666 *&c.*

Again, $\dot{3}2\dot{5}.\dot{3}2\dot{5}\div 1000=.\dot{3}2\dot{5}$.

And $.\dot{3}2\dot{5}\times 999=324.999$ *&c.*=325 (by *Lemma* 1.) and 325 is equal to $\dot{3}2\dot{5}.325-.\dot{3}2\dot{5}$.

COROLLARY III.

It is evident from the laſt *Corollary* that a *Single Repetend* is to the *ſame Number terminate or compleat*, as 10 is to 9; a *Compound Repetend of two Places*, as 100 to 99; and a *Compound Repetend of three Places* is to the ſame Number terminate or compleat, as 1000 is to 999, *&c.* And by the *Converſe* of the ſaid Corollary it muſt follow, that any Number multiplied by 1 with as many Cyphers as it contains Figures, and the *Product* divided by as many *Nines*, will give the *ſame Number perpetually circulating.*

Thus 6×10=60, and 60÷9=6.666 *&c.*

And 325×1000=325000, and $325000\div 999=\dot{3}2\dot{5}$.

COROLLARY IV.

Hence alſo, if any Number be divided by as many *Nines* as it contains Figures, and the *Quotient* added to the ſaid Number, the Reſult will be the ſame as before; for any Number multiplied by 10, and the Product divided by 9, the Quotient muſt be equal to $\frac{1}{9}$ of the ſame Number added to itſelf.

Thus the Quotient of 6÷9 added to 6=6.666 *&c.*

And the Quotient of 325÷999 added to $325=\dot{3}2\dot{5}$.

LEMMA III.

Any Number divided by 9. 99. 999. *&c.* will be equal to the *Sum* of the Quotients of the ſame Number continually divided by 10. 100. 1000. *&c.* as appears from the following Examples, where the *Sum* of the Quotients of 737, continually divided by 10, is found to be the ſame as 737 divided by 9. And the *Sum* of all the Quotients of 236847, continually divided by 1000, is equal to the ſame Number divided by 999. See the Work.

$$\begin{array}{r}
737 \\
\hline
73.7 \\
7.37 \\
.737 \\
737 \\
\hline
81.\cancel{8} \\
\hline
\end{array}
\qquad
\begin{array}{r}
236847 \\
\hline
236.847 \\
.236847 \\
236 \text{ \&c.} \\
\hline
237.\cancel{0}8\cancel{4} \\
\hline
\end{array}$$

$$\begin{array}{l}
9)737(81.\cancel{8} \\
72 \\
\hline
17 \\
9 \\
\hline
80 \\
72 \\
\hline
8
\end{array}
\qquad
\begin{array}{l}
999)236847(237.\cancel{0}8\cancel{4} \\
1998 \\
\hline
3704 \\
2997 \\
\hline
7077 \\
6993 \\
\hline
8400 \\
7992 \\
\hline
4080 \\
3996 \\
\hline
84
\end{array}
\left.\begin{array}{l} \\ \\ \\ \\ \end{array}\right\} \textit{ad infinitum:}$$

SCHOLIUM.

From the preceding *Lemma* and *Corol.* 4. appears the Reaſon of finding the *true* Product, as directed in the 2nd. *Caſe* of *Multiplication*, and the Reaſon of multiplying by 10 and dividing by 9, as directed in the 1ſt *Caſe*, is evident from *Corol.* 3. And the Reaſon of the *Rules* in *Diviſion* are obvious from *Lemma* 2. and *Corol.* 1 and 2.

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SECT. V.

Shewing the Uſe *of* Repetends *in a few miſcellaneous Queſtions.*

Queſtion 1. If 46 Hhds. 21 Gal. Wine coſt 785 *l.* 13 *s.* 4 *d*, what is the Price of one Hogſhead?

H. *G.* *H.* *l.* *s.* *d.* *l.*

Firſt 46 : 21 = $46.\dot{3}$, and 785 : 13 : 4 = $785.\dot{6}$

H. *l.* *H.*

Then, if $46.\dot{3}$ —— $785.\dot{6}$ —— 1

Sub. 4.6 78.5

l. *l.* *s.* *d.*

41.7)707.1(16.956 = 16 : 19 : $1\frac{1}{2}$ the Anſwer

417

2901

2502

3990

3753

2370

2085

2850

2502

348

Queſtion 2. If Sugar is bought at 2 *l.* 7 *s.* 8 *d.*=$2.38\dot{3}$ *l.* *per* Hund. At how much *per C.* muſt it be ſold to gain 6 *per Cent.*?

l. *l.* *l.*
If 100——106——$2.38\dot{3}$
106

14300
$238\dot{3}33$

The Product÷100=$2.526\dot{3}$=2 *l.* 10 *s.* 6¼ *d.* the Anſwer.

E. F. Q. Ells Flem.
Queſt. 3. 294 : 2=$294.\dot{6}$ at 7 *s.* 8 *d.* *per* Ell.
s. *d.*
6 : 8 - ⅓ $98.\dot{2}2$
1 : - - $\frac{1}{20}$ $14.7\dot{3}$

The Sum $112.9\dot{5}$=112 *l.* 19 *s.* 1¼ *d.* the Anſwer.

Oz. P.w. gr. Oz.
Queſt. 4. 76 : 7 : 8=$76.3\dot{6}$ at 16 *s.* 4 *d.* *per* Oz.
Mult. by .8 the Dec. of 16 *s.*

d. $61.09\dot{3}3$
4 - $\frac{1}{60}$ $1.27\dot{7}$

Anſwer $62.366\dot{1}$=62 *l.* 7 *s.* 3¾ *d.*

℔. *oz. P.w.* ℔.
Queſt. 5. 46 : 8 : 16=$46.7\dot{3}$ at 7 *l.* 8 *s.* 6 *d.* *per* ℔.
Mult. 7.4=7 *l.* 8 *s.*

$18.69\dot{3}3$
d. $327.1\dot{3}33$
6 - $\frac{1}{40}$ $1.168\dot{3}$

Anſwer 346.9950=346 *l.* 19 *s.* 10¾ *d.*

T. H. Gal. Ton.
Queſt. 6: 48 : 2 : 28=48.61 at 27 *l.* *per* Ton.
Mult. 27

3402$\cancel{7}$
972$\cancel{2}$2

Anſwer 1312.50=1312 *l.* 10 *s.*

Queſt. 7. Suppoſe 3 Partners, A, B and C, make a *Joint-Stock* in this Manner.

	l.	*s.*	*d.*	*l.*
A puts in	245 :	6 :	8=	245 $\cancel{3}$333
B —	172 :	14 :	0=	172.7
C —	196 :	5 :	2=	196.258$\cancel{3}$
The whole Stock	614 :	5 :	10=	614.291$\cancel{6}$

With this Stock they trade and gain 100 *l.* 14 *s.* 10½ *d.* =100.74375 *l.* what is each Man's Share of the Gain?

Firſt, as 614.219$\cancel{6}$: 100.74375 : : 1 : .164 the common Multiplier.

245.$\cancel{3}$
Next Mult. .164

981$\cancel{3}$
14720$\cancel{0}$
245$\cancel{3}$33

40.234$\cancel{6}$

172.7
Mult. .164

6908
10362
1727

28.3228

196.258$\cancel{3}$
Mult. .164

785033$\cancel{3}$
117755$\cancel{0}$
196258$\cancel{3}$

32.1863$\cancel{6}$

	l.	*l.*	*s.*	*d.*
A's Share	40.234$\cancel{6}$6=	40 :	4 :	8¼
B's Share	28.3228 =	28 :	6 :	5½
C's Share	32.1863$\cancel{6}$=	32 :	3 :	8¾
The Gain	100.7438$\cancel{3}$=	100 :	14 :	10½

Queſt. 8. What is the Simple Intereſt of 247 *l.* 13 *s.* 4 *d.* =247.$\dot{6}$ for 2 Years, and 156 Days, at 4 *per Cent.* ?

l.
Firſt, 247.$\dot{6}$
.04

9.90$\dot{6}$ the Intereſt for 1 Year.

Years. *Yrs.* *Days.*
Next mult. the Time 2.427398=2 : 156
by $\dot{6}$09.9 the Intereſt for 1 Year.

21.8466
2.1846
146
14
1
l. *s.* *d.*
24.0473=24 : - : 11$\frac{1}{4}$ the Intereſt required.

Note, In contracted Multiplication, when there is a *ſingle Repetend* in the Multiplier, the firſt Product of ſuch Repetend (which in this Example is .0146) muſt be continually repeated, placing it each Time one Figure to the Right-hand, till (by rejecting at the ſame Time the Right-hand Figure as of no Value) the Product terminates in a ſingle Digit.

Queſt. 9. How much Money of *Amſterdam* will 543 *l.* 6 *s.* 8 *d. Sterling*=*l.* 543.$\dot{3}$ come to at 36 *s. Flem. per l. Sterling?*

s. 543.$\dot{3}$3 at 1 *l.* 16 *s.*
10 - ½ 271.$\dot{6}$6
5 - ½ 135.8$\dot{3}$
1 - ⅕ 27.1$\dot{6}$

978.00 *l. Flem.*
Mult. 6

Anſwer 5868 Guil.

Or thus.

543 at 36 *s.*
36

3260
1630

19560 Schillings.
Mult. .3

5868.0 Guilders as before.

Queſt. 10. How much much Money of *Hamburgh* will 72 *l.* 12 *s.* 8 *d. Sterl.* come to at 35 *s.* 2 *d. Flem. per l. Sterl.?*

72.6$\dot{3}$ at 35 : 2
Mult. 105½ 3

363.1$\dot{6}$6 105 : 6
726$\dot{3}$.333
½ 36.31$\dot{6}$

8)7662.81$\dot{6}$

957.852
Sub. .75 =12 Shil.

Rem. .102= 1 Shil. 7 Ph.

Hence the Anſwer is 957 Marks, 13 Sh. 7 Ph.

Queſt. 11. How much *Sterl.* will 940 Ducats come to at 4 *s.* 2 *d.* *per* Ducat?

$$\begin{array}{lll} & & 940 \\ s. & d. & \overline{} \\ 3: & 4 - \frac{1}{6} & 156.\not{6}5 \\ & 10 - \frac{1}{4} & 39.1\not{6} \\ \hline \end{array}$$

Anſwer $195.8\not{3} = 195$ *l.* 16 *s.* 8 *d.*

It is plain by theſe Queſtions, that underſtanding the Management of *Repetends* is ſometimes ſerviceable in Computations relative to Buſineſs, not that the Knowledge of them is abſolutely neceſſary in performing the ſaid Queſtions, becauſe any of them may be worked decimally without, but then they would require more Places of Decimals, and conſequently more Figures in the Operation.

In the next Place, that nothing uſeful may be here wanting in regard to *circulating Numbers*, I ſhall inſert two or three Problems for finding the *Logarithm* of them, which may be acceptable to thoſe who are already acquainted with Logarithms, but perhaps may not know the Manner of finding the *Logarithm* of *Repetends.*

SECT. VI. Problems *for finding the* Logarithm *of* Repetends.

Previous to the Problems, it may be proper to ſhew how to find the *Arithmetical Compliment* of any *Logarithm.* This is done by ſubtracting each Figure of the given Logarithm (beginning at the Left-hand) from 9, and the laſt from 10. Thus the *Arithmetical Compliment* of the *Log.* 3.8649262 will be found 6.1350738.

Note, It muſt be obſerved in the following Examples, and in all Operations of the like Kind, that the *Indexes* of the *Arithmetical Compliments* are omitted.

PRO-

PROBLEM I.

To find the *Logarithm* of a *ſingle Repetend*, or *circulating Digit.*

Rule. To the *Tabular Logarithm* of the Digit, add the *Arithmetical Complement* of the Logarithm of 9, the Sum is the Log. ſought.

Example. Required the *Logarithm* of $\dot{6}$.

To the *Tabular Logarithm* of — 6 = 0.7781512
Add the *Arith. Comp.* of the Log. 9 = 0.0457575

The Sum is the *Logar.* ſought of $\dot{6}$ = 0.8239087

PROBLEM II.

To find the *Logarithm* of any pure *Compound Repetend.*

Rule. To the *Tabular Logarithm* of the Number (as terminate) add the *Arithmetical Compliment* of the Logarithm of ſo many 9's, as there are Places of the *Repetend*; the Sum is the Logarithm of the given Repetend.

Example 1. Required the *Logarithm* of the *Compound Repetend* $\dot{2}\dot{4}$.

To the *Tabular Logarithm* of — 24 = 1.3802112
Add the *Arithmetical Compliment* of 99 = 0.0043648

The Sum is the *Logarithm* of — $\dot{2}\dot{4}$ = 1.3845760

Example 2. Required the *Logarithm* of $\dot{3}6.\dot{5}$

To the *Tabular Logarithm* of — 36.5 = 1.5622929
Add the *Arithmetical Compliment* of 999 = 0.0004345

The Sum is the *Logarithm* of — $\dot{3}6.\dot{5}$ = 1.5627274

Examp.

Example 3. Required the *Logarithm* of $\dot{3}74\dot{6}$.

To the *Tabular Logarithm* of 3746 = 3.5735678
Add the *Arith. Comp.* of the Log, of 9999 = 0.0000434

The Sum is the *Logarithm* of $\dot{3}74\dot{6}$ = 3.5736112

Example 4. Required the *Logarithm* of $\dot{2}00.6\dot{0}$.

To the *Tabular Logarithm* of 200.60 = 2.3023309
Add the *Arith. Com.* of the Log. of 99999 = 0.0000043

The Sum is the *Logarithm* of $\dot{2}00.6\dot{0}$ = 2.3023352

PROBLEM III.

To find the *Logarithm* of any *mixed Repetend*, either *Single* or *Compound*.

Rule. From the given mixed *Repetend*, ſubtract its *terminate* Part; then to the *Logarithm* of the Remainder add the *Arithmetical Compliment* of the Logarithm of ſo many *Nines*, as there are Figures in the *Repetend*, the Sum will be the *Logarithm* ſought.

Example 1. Required the *Logarithm* of $2.\dot{6}$

From the given *Repetend* —— $2.\dot{6}$
Subtract the *terminate* Part — .2

Then to the *Logarithm* of — 2.4 = 0.3802112
Add the *Arith. Comp.* of the Log. of 9 = 0.0457575

The Sum is the *Logarithm* of — $2.\dot{6}$ = 0.4259687

Example 2. Required the *Logarithm* of $57.2\dot{3}$.

From the given *Repetend* — $57.2\dot{3}$
Subtract the *terminate* Part — 5.72

Then to the *Logarithm* of —— $51.51 = 1.7118915$
Add the *Arith. Comp.* of the Log. of $9 = 0.0457575$

The Sum is the Log. of — $57.2\dot{3} = 1.7576490$

Example 3. Required the *Logarithm* of $2.7\dot{8}\dot{3}$.

From the given *Repetend* — $2.7\dot{8}\dot{3}$
Subtract the *terminate* Part — 27

Then to the *Logarithm* of — $2.726 = 0.4355258$
Add the *Arith. Comp.* of the Log. of $99 = 0.0043648$

The Sum is the *Log.* of $2.7\dot{8}\dot{3} = 0.4398906$

Example 4. Required the *Logarithm* of $7\dot{2}5.\dot{6}$

From — — $7\dot{2}5.\dot{6}$
Subtract — — — 7

To the *Logarithm* of — $724.9 = 2.8602781$
Add the *Arith. Comp.* of the Log. of $999 = 0.0004345$

The Sum is the *Log.* of — $7\dot{2}5.\dot{6} = 2.8607126$

Example 5. Required the *Logarithm* of $26\dot{8}92.\dot{7}$

From — — $26\dot{8}92.\dot{7}$
Subtract — — 2.6

To the *Logarithm* of — $26890.1 = 4.4295924$
Add the *Arith. Com.* of the Log. of $9999 = 0.0000434$

The Sum is the *Log.* of — $26\dot{8}92.\dot{7} = 4.4296358$

In like Manner may the *Logarithm* of any other *mixed Repetend* be found, ſo far as the *Canon* of *Logarithms* (you uſe) will permit.

THE END.

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